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Air Pollution Technical Information Center
Research Triangle Park, North Carolina

November 1972

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AIR POLLUTION ABSTRACTS

23998–24522

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This periodical is published to inform air pollution personnel of the Environmental Protection Agency (EPA), and others, of technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given. Translations are cited with their sources whenever possible. The subject fields are as follow: Emission Sources; Control Methods; Measurement Methods; Air Quality Measurements; Atmospheric Interactions; Basic Science and Technology; Effects-Human Health; Effects-Plants and Livestock; Effects-Materials; Economic Aspects; Standards and Criteria; Legal and Administrative; Social Aspects; and General and Miscellaneous. All abstracts are listed under one of the above subject fields. A subject and author index are included. This issue contains abstracts 23998 - 24522.

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APTIC Publications

Air Pollution Aspects of Emission Sources: Petroleum Refineries - A Bibliography With Abstracts, July 1972, GPO No. EP 4.9:110, (price not yet available).

Air Pollution Aspects of Emission Sources: Iron and Steel Mills - A Bibliography With Abstracts, May 1972, GPO No. EP 4.9:107, $1.00.

Air Pollution Aspects of Emission Sources: Boilers - A Bibliography With Abstracts, May 1972, GPO No. EP 4.9:105, (price not yet available).

Hydrochloric Acid and Air Pollution: An Annotated Bibliography, July 1971, GPO No. EP 4.9:100, $0.55.

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Photochemical Oxidants and Air Pollution: An Annotated Bibliography (2 Volumes), March 1971, GPO No. EP 4.9:88, $6.25.

Beryllium and Air Pollution: An Annotated Bibliography, February 1971, GPO No. EP 4.9:83, $0.40.

Asbestos and Air Pollution: An Annotated Bibliography, February 1971, GPO No. EP 4.9:82, $0.50.

Municipal Incineration: A Review of Literature, June 1971, GPO No. EP 4.9:79, $1.00.

Hydrocarbons and Air Pollution: An Annotated Bibliography (2 Volumes), October 1970, GPO No. HE 20.1309:75, $5.00.

Nitrogen Oxides: An Annotated Bibliography, August 1970, GPO No. HE 20.1309:72, $2.75.

Air Pollution Translations: A Bibliography With Abstracts Volume I, May 1969, GPO No. FS 2.93/3:56, $1.75.

Air Pollution Translations: A Bibliography With Abstracts Volume II, April 1970, GPO No. HE 20.1309:69, $1.00.

Carbon Monoxide, A Bibliography With Abstracts. 1966, GPO No. PHS 1503, $2.50.

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INTRODUCTION

This periodical is intended to inform personnel of the Environmental Protection Agency (EPA), and others who are also professionally interested in air pollution, of selected technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given.

EPA's staff should direct requests for full text duplicates (if not locally available) to APTIC, using the order form provided. Translations of foreign language documents may be arranged for these personnel upon request.

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Translations are cited with their sources whenever possible. If a translation proves to be unavailable from the source cited, or if a translation is cited without a source, it may be located through APTIC or through the National Translations Center, 35 West 33rd Street, Chicago, Illinois 60616.

The serial publications (journals, periodicals, etc.) which are regularly screened for input are listed with their publishers' addresses in one issue in each volume of our abstract bulletin; the most recent list appeared in the December 1971 issue.

As another service, abstracts of all of the literature in APTIC (not just in a single issue of this periodical) on any subject related to air pollution will be provided free of charge upon request. APTIC can search information more recent than that in the current issue of this periodical because of the lapse of time entailed by editorial, make-up, and printing work. More than 1400 subject index terms are available for such searching ---more than those included in the subject index in each issue.

Feedback from our users, including suggestions of articles for abstracting, are always welcome.

SUBJECT FIELDS AND SCOPE NOTES

1. EMISSION SOURCES

Information pertaining to an industry, process, or material Information pertaining to an industry, process, or material associated with air pollution. Documents in this category are concerned primarily with characteristics of a specific class of emission sources including types, rates, industries; secondary coverage may include effects, control methods, etc.

2. CONTROL METHODS

Includes equipment and both specific source control and general abatement efforts. Included are documents describing the operating principles, design, operation, efficiency, etc., of equipment and methods of removing pollutants. The scope of the document can vary from a device for a specific source to an approach applicable to an entire industry--e.g., automobiles.

3. MEASUREMENT METHODS

Includes equipment as well as methods. Confined to development testing and evaluation of pollutant determination methods (sampling, analytical, monitoring) and equipment, as such. Data obtained by use of methods in specific applications are placed in the applicable subject categories.

4. AIR QUALITY MEASUREMENTS

Pollution measurements in the ambient air, generally related to specific geographical locations, such as area surveys. Also includes general reviews of area situations and emission source inventories.

5. ATMOSPHERIC INTERACTION

All chemical and physical phenomena occurring in the atmosphere Included is material on dispersion, air pollution forecasts, meteorological effects, topographical effects, photochemical reactions in the atmosphere, etc. Laboratory studies of photochemical reactions are assigned to Basic Science and Technology.

6. BASIC SCIENCE AND TECHNOLOGY

General discussions or data compilations for the basic physical and chemical properties of pollutants. Theoretical and laboratory studies on related chemical and biological reactions and mechanisms. Mass transfer and other basic knowledge related to process engineering applications in emission control or abatement. Excludes photochemical studies in the atmosphere and biochemical studies related to effects of air pollution.

7. EFFECTS--HUMAN HEALTH

Covers medical and epidemiological studies; biological effects other than those on plants and livestock produced by air pollutants, laboratory animal experiments.

8. EFFECTS--PLANTS AND LIVESTOCK

Effects on vegetation--crops, trees, other plants--and on livestock as distinguished from laboratory experimental animals.

9. EFFECTS--MATERIALS

Deterioration, corrosion, etc., of physical materials, buildings, and structures.

10. ECONOMIC ASPECTS

Economic implications of air pollution and its control, e.g., economic losses from pollution damage, and costs of control programs or equipment in general.

11. STANDARDS AND CRITERIA

Recommended or adopted guides, criteria and standards for allowable emission limits or pollutant concentrations, air quality, equipment characteristics, and fuels.

12. LEGAL AND ADMINISTRATIVE

Legal aspects include legislation, ordinances, rules, litigation, hearings, decisions, etc. Administration covers administrative and miscellaneous information concerning control agencies and control and research programs. Typical topics are personnel, budgets, contractual activities and program descriptions.

13. SOCIAL ASPECTS

Sociological and psychological aspects such as social attitudes public opinion studies, public relations, and public information.

14. GENERAL AND MISCELLANEOUS

Reviews of general problems, trends and background. Documents not assignable to other categories.

ABSTRACT BULLETIN

EMISSION SOURCES

1972

23998 APTIC NO. 43892

WHEN IS INFECTIOUS WASTE NOT INFECTIOUS WASTE? Hospitals, J. Am. Hospital Assoc., 46(9):56, 60, 64-65, 195-196, May 1972. 13 refs.

According to existing California law, hospitals were only allowed to dispose of their solid wastes through incineration because of their infectious waste content. However, even the most modern incinerator installation at a southern California hospital could not meet the air pollution control requirements for hydrocarbons, in part due to the large amounts of plastic materials in hospital waste. The Hospital Council of Southern California was formed to study the situation. The Committee on solid waste disposal defined the following areas of infectious wastes from hospitals: significant laboratory wastes, including pathologic specimens, disposable specimens, and disposable fomites attendant thereto; surgical operating room pathologic specimens and disposable fomites attendant thereto; similar disposable materials from outpatient areas and emergency departments, and equipment, instruments, utensils, and fomites of a disposable nature from the rooms of patients with suspected or diagnosed communicable diseases. On the basis of this definition, a survey was made of general hospitals in the southern California area to determine the percentage of infectious waste in the total solid waste generated. With the finding that infectious waste made up less than four tenths of 1% of the total solid waste, the Los Angeles County sanitation districts, and subsequently the city of Los Angeles sanitation district, revised their regulations to include acceptance of infectious waste that had passed through an approved grinding device into the sewage systems. The city modification was different from the county modification in that it excluded the grinding of human tissue.

23999 APTIC NO. 44033

WASTE SYNTHETIC PAPER-AN ECOLOGICAL HAZARD. *Paper, 1(1):60-61, June 7, 1972. 5 refs.*

The chief problems associated with the industrial development of synthetic paper are the recovery of waste and the treatment of refuse mixed with synthetic paper. Although Japan leads in the recovery of waste paper, there has been a steady drop in the rate, from 40.4% in 1966 to 39.3% in 1967 and 36.8% in 1968, attributed to the growing urban traffic problem, the higher cost of recovery, and a reduction in the number of small collectors of waste paper. Apart from using improved incinerators, gasification by cracking, land-filling, and disposal in the sea, treatment of polyethylene with microbes and its natural decomposition are being considered as a way to eliminate synthetic paper. Problems with these methods are cited, including methods of regenerating and reusing waste synthetic paper. Polyvinyl chlorides and the degradation of plastics are also considered.

24000 APTIC NO. 44117

ENVIRONMENTAL AUDITORS SPEAK OUT ON SO2. *Elec. World, 178(3):22-23, Aug. 1, 1972. 1 ref.*

A 120-page sulfur dioxide research report, which is available to electric utilities, concludes that the major contributing factors to the SO2 air pollutant levels on Long Island are emission sources west of the New York City line and space heating systems. One of the startling findings of the recently released study by a six man research team from Environmental Analysts Inc. of Garden City, New York, is that if Long Island Lighting Co. power plants emitted no SO2 at all, the drop in annual average levels of SO2 on Long Island would be almost imperceptible. The concept behind this study is that SO2 ambient levels bear little relationship to the quantity of material that is released, but bear a much greater relationship to the characteristic of the release itself. This concept is discussed with regard to the influence of electric utilities on SO2 emissions.

24001 APTIC NO. 44185

SPRING FAIR 1972: WATER ECONOMY AND VENTILATION ENGINEERING AT LEIPZIG. *(Fruehjahrsmesse 1972: Wasserwirtschaft und Lufttechnik in Leipzig). Text in German. Wasser Luft Betrieb, 16(6):184-186, June 1972.*

Products from East European countries, exhibited at the Leipzig Spring Fair 1972, are described. A portable instrument for exhaust carbon monoxide measurements provides direct reading, and is simple in operation. A series of compact electrostatic dust separators with capacities ranging from 4500 to 33,500 cu m/hr at a flow rate of 1 m/sec is useful in all branches of industry where mechanical or tissue filter techniques are unable to give optimum result. Two different models of a bag filter (filter area 175-525 sq m and 350-1225 sq m) with dust removal by vibration and countercurrent were developed. A gas alarm device, intended for use in gas boiler rooms gives acoustic and light signals at a concentration corresponding to 20% of the lower ignition limit, and both the above signals are released and the main gas valve is shut at 40% of the ignition limit.

24002 APTIC NO. 44269

Hachioji Chamber of Commerce (Japan), Industrial Pollution Information Bureau

REPORT ON INVESTIGATIONS ON INDUSTRIAL POLLUTION BY QUESTIONNAIRES. *(Sangyo Kogai ni kansuru anketo chosa hokokusho). Text in Japanese. 31p., 1972.*

Questionnaires about industrial pollution and its control were sent to 690 industrial companies in Hachioji. Of the 216 companies who responded, 71.8% knew about the pollution-control regulations in Tokyo and 77.3% reported having received complaints concerning noise, soot, odor, dirty water, and dust. Among the latter, 77.6% of the companies answered that they resolved the complaints, 14.3% that they could not resolve them, and 8.1% that they were negotiating. Sixty two% of the companies do not contemplate installing pollution control devices and 26.4% of the companies have devices. Of the latter companies, 36.9% spent less than $1666. 66.7% of the companies finance the devices entirely by themselves and 17.5% of the companies finance partially by themselves and partially through borrowing. Sixty three % of the companies know about the industrial-pollution counseling service in Hachioji and 74.0% of these companies wish to consult with counselors.

24003 APTIC NO. 44358

NATURAL GAS AUTOMOTIVE FUEL PROVIDES PARTIAL ANSWER FOR INDUSTRIAL FLEETS. *Can. Petrol., 13(5):30-33, May 1972.*

Canadian test projects in which automotive vehicles have been fueled with compressed natural gas (CNG) to reduce air pollution demonstrate the limitations of CNG. Steel CNG cylinders filled up to 2200 psi add weight, reduce available space, and give a range of only 50 mi, thereby requiring that the gasoline fueling system be retained for alternative use. The CNG fueling stations are costly, and refueling has provided more trouble to date than vehicle operation. Natural gas in compressed or in liquid form seems unlikely to replace gasoline for the individual motorist, but there is a possibility of cost savings by using liquefied natural gas or CNG in fleets traveling limited distances on regular routes, especially if there are tax concessions such as are given to users of natural gas in some U. S. states.

24004 APTIC NO. 44072

Ansorge, Dietmar W.

CONTRADICTIONS IN CONNECTION WITH A SANITARY LANDFILL. *(Widersprueche um eine Muelldeponie). Text in German. Tech. Umweltmag., no. 3:23-25, June 1972.*

In 1968 one of the greatest sanitary landfills in Europe started work near Gerolsheim, based on hydrogeologic investigations in 1957 which qualified the ground under the deposit site as very suitable for this purpose. Important quantities of hexachlorcyclohexane were transported in open containers to the sanitary landfill which caused air pollution by forming bad odors. Incorrectly deposited acid tar containing up to 30% concentrated sulfuric acid polluted the air so badly that work on the surrounding fields had to be stopped. As a consequence of the air pollution through industrial refuse, the farmers of the region suffered important financial losses, since the potatoes and cucumbers from the fields surrounding the sanitary landfill had such a bad taste that they could not be sold. Nevertheless, the sanitary landfill is still open to industrial refuse. Thus, it seems clear that environment protection was subordinated to economic interests.

24005 APTIC NO. 44107

Bare, Fred

THE SWISS LACQUER AND PAINT INDUSTRY AND ENVIRONMENTAL PROTECTION. *(Die Schweizerische Lack- und Farbenindustrie und der Umweltschutz). Text in German. Chem. Rundschau (Solothurn), 25(29):937-939, 942, July 1972. 16 refs.*

The Swiss lacquer industry comprises about 130 small and medium- sized companies. The annual production amounts to 65,000 tons. Until 50 years ago, mainly oil paints and enamel varnishes were used. They dried slowly, but contained few solvents. With the coming of nitrocellulose and alkyd resin lacquers and later of lacquers on the basis of chlorinated rubber, vinyl resins, polyurethane, and aethoxilin resins came also the air pollution problem. These lacquers contain solvents which enter the ambient air after application. Of the various solvent groups which are emitted, the various benzenes head the list, as far as emission quantity is concerned, followed by the aromatic hydrocarbons such as toluene and xylene. The basis for legal action against such enterprises in an effort to stem the solvent emission is provided by paragraphs 679 and 684 of the civil law code, the traffic law, and the work law of 1964. Measures can be taken when justified complaints against such an enterprise are voiced. In the near future guidelines will be issued concerning maximum allowable emissions. The pollutants are blown into the air from the workshops by ventilators; sometimes the waste air is passed over a filter. Generally, it can be said that the waste air problem in this industrial sector does not pose unsurmountable difficulties.

24006 APTIC NO. 43917

Cauley, S. P. and C. W. Siegmund

UPDATING EMISSION FACTORS FOR SPACE HEATING WITH FUEL OIL. *Preprint, American Petroleum Inst., New York, Div. of Refining, 19p., 1972. 4 refs. (Presented at the American Petroleum Institute, Division of Refining, Midyear Meeting, 37th, New York, May 10, 1972, Paper 29-72.)*

Field data on 20 residential and 8 commercial burners (60-350 hp) using natural gas, fuel oil No. 2-6, or 0.5-1% sulfur fuel oils, showed that for residential units, the measured emission factors are generally higher for carbon monoxide and nitrogen oxides and lower for hydrocarbon and filterable particulates than the U. S. Environmental Protection Agency values. Smoke number of the Bacharach scale at steady-state conditions is not a good measure of integrated particulate emissions on a weight basis. For the commercial boilers, the EPA measured emission factors for nitrogen oxides are higher than they should be for distillate combustion but about right for the average of all residual fuels, and the measured emission factors for particulates are higher than they should be for distillate combustion for the average of all residual fuels. Low-sulfur fuel oils emit significantly less nitrogen oxides and particulates than No. 6 fuel oil. Lower grade-number fuels give significantly lower particulate emissions. Boiler size, fuel nitrogen content, and undefined boiler characteristics affect nitrogen oxides emission from commercial boilers.

24007 APTIC NO. 44286

Cole, David E.

THE WANKEL ENGINE. *Sci. Am., 227(2):14-23, Aug. 1972.*

Wankel engine design and the advantages of its use in the construction of new automobiles are presented, and the requirements of an efficient, economical, and competitive design for the manufacturers are emphasized. Results of experiments conducted at the University of Michigan with a thermal reactor attached to a Wankel engine are presented. If the Wankel engine can successfully replace the piston engine and be produced at a competitive price, it will qualify as the engine of the future. The Wankel engine, known also as the rotary engine, the rotating combustion engine, or the R.C. engine, has three small chambers of variable size, each of which undergoes a complete four-stroke Otto cycle in one revolution of the rotor. On the intake stroke, a fresh charge of fuel and air enters the chamber through the intake port, which is always open. As the rotor turns clockwise the charge is sealed off and compression begins. When the charge is fully compressed, it is ignited by the firing of a spark plug. The expanding combustion gases drive against the rotor until the exhaust port is uncovered, allowing the spent gases to escape. Wankel s crankshaft, which transmits the engine s torque, runs in sliding contact with the triangular rotor. It makes three rotations for each rotation of the rotor. A three-piece apex seal is used on recent versions of the Curtiss-Wright rotating combustion engine. Two small triangular-shaped elements float freely against the main blade and provide effective seals at the corner of the chamber. The thermal reactor, tested at the University of Michigan, is an after-engine device designed to reduce the amount of unburned hydrocarbons to less than 200 ppm. Wankel engines release only about one-half as much nitrogen oxides as conventional piston engines, due to the high surface-to-volume ratio of the combustion chamber and slower burning and the rapid cooling of the hot gases. Wankel engines show considerable stratification. It seems that these advantages make the Wankel engine the engine of the future.

24008 APTIC NO. 44086

Dai, Junkichiro

COMBUSTION OF A HYDROCARBON FUEL (II). *(Tanka suiso nenryo no nensho ni kansuru ichi-kosatsu (daniho)). Text in Japanese. Bull. Koyama Coll. Eng., Res., no. 3:50-57, March 1972. 2 refs.*

The effects of fuel type and stoichiometric air on combustion efficiency are described. The theoretical air composition is changed greatly when the chemical composition of the fuel is changed for burning carbon to carbon dioxode, burning hydrogen to water, and burning carbon to carbon monoxide. The values for carbon combustion to CO2 and for hydrogen combustion to H2O are directly proportional to the combustion efficiency; the value for the combustion of carbon to CO is inversely proportional to it. Six theoretical air combinations are involved. A comparison is made between combustion efficiency expressed by CO2 content and combustion efficiency defined in the present study. Carbon dioxide combustion efficiency is defined as the ratio of CO2 actuall present in exhaust gases to CO2 obtained theoretically from perfect combustion. A graphic method of analysis of unburned gas is devised, from which the CO/H2 ratio can be determined. The difference between the mass of CO and the mass of H2 in the combustion products is considered. The maximum occurring at a particular value of combustion efficiency can be obtained by equating the CO/H2 concentration differential with respect to combustion efficiency to zero. The effects of excess air ratio are examined.

24009 APTIC NO. 44020

Drake, R. M., Jr. and J. E. Funk

ENERGY: PROBLEMS, PROSPECTS AND PRIORITIES. *Preprint, American Inst. of Aeronautics and Astronautics, New York, 20p., 1972. 42 refs. (Presented at the American Institute of Aeronautics and Astronautics, Thermophysics Conference, 7th, San Antonio, Tex., April 10-12, 1972, Paper 72-253.)*

The present and projected status of energy production and consumption is reviewed, with particular emphasis on United States requirements. An assessment of technological developments by which future requirements might be met is presented which covers power generation from fossil fuels, nuclear fission, nuclear fusion, and solar energy. While pressures exist to decrease population growth and to reduce the per capita energy consumption, it is not likely that these pressures will have much effect in this century. For the next 30-50 yrs continued heavy use will have to be made of fossil fuels, particularly coal and oil, as nuclear fission power systems will come too slowly. Processes for the gasification and solvent refining of coal to produce clean fuels will have to be commercialized as soon as possible. The nuclear fission power systems will have to evolve from the present light water reactors to the full use of some commercial form of breeder reactor to ensure an adequate and economical supply of nuclear fuel beyond 2000. The overview which is presented reinforces arguments in favor of national policies on energy and science and technology. (Author abstract modified)

24010 APTIC NO. 43872

Frost, H. J.

ENVIRONMENTAL PROBLEMS FROM AN INDUSTRIAL POINT OF VIEW. *(Umweltprobleme aus industrieller Sicht). Text in German. Oeffentl. Gesundheits-wesen (Stuttgart), 34(4):184-190, April 1972.*

In addition to the foods necessary for the maintenance of his existence, man uses a large number of goods for the development of his personality; goods that he has learned to produce from the raw materials of the earth in a development process that has lasted thousands of years. These transformation processes are linked with wastes which pollute the air, water, or earth according to their composition, since human life is lived out in an environment characterized by the rule of the conservation of matter. The production of goods from the raw materials is the task of industry. It has the natural tendency to keep the inevitable transformation losses as small as possible. Because the people employed in industry are working closest to the industrial sources of environmental pollution, appropriate devices have been developed to lower the nuisance level of the neighborhood or the public in general in the spirit of section 16 of the Industrial Code. Results attained at the Badischen Anilin and Soda-Fabrik A. G. support this statement. (Author summary modified)

24011 APTIC NO. 44202

Gasparovic, Nebojsa

UNIT CAPACITIES OF GAS TURBINES. *(Einheitenleistungen der Gasturbinen). Text in German. Elektrizitaetswirtschaft, 71(12): 343-353, 1972. 34 refs.*

Possibilities of increasing the unit capacities of gas turbines and the advantages of semi-closed cycle gas turbines with regard to unit capacities, efficiency, and nitrogen oxides emissions are described. Semi-closed cycle gas turbines can reach capacities up to 600 mw with specific installation costs reduced by 30-40% as compared to open-cycle gas turbines. Gas-steam equipment with semi-closed cycle gas turbines may reach even higher unit capacities at efficiencies up to 38%. In addition, semi-closed cycle gas turbines generate about one fortieth of the nitrogen oxides emitted by open-cycle gas turbines or conventional thermal power plants (0.005 g/kwh vs 2-2.5 g/kwh). If combustion takes place in the gas mixture, the low temperature guarantees low nitrogen oxides concentrations even with long residence times and high oxygen excess. If combustion occurs in the air current with combustion gases cooled in closed cycle, the high nitrogen oxides concentration can be considerably decreased by reducing the flame temperature.

24012 APTIC NO. 43747

George, R. E., J. S. Nevitt, and J. A. Verssen

JET AIRCRAFT OPERATIONS: IMPACT ON THE AIR ENVIRONMENT. *J. Air. Pollution Control Assoc., 22(7):507-515, July, 1972. 6 refs. (Presented at the Air Pollution Control Assoc., Annual Meeting, 64th, Atlantic City, N. J., June, 1971, Paper 71-117.)*

Results of an air pollution study of jet aircraft operations at the Los Angeles International Airport are summarized. Data included are jet engine exhaust measurements for currently used turboprop, turbojet and turbofan engines; measurements of specific contaminants in the atmosphere inside and outside of passenger terminals and ticketing areas, and in aircraft cabins during ground operations including passenger loading and taxiing prior to takeoff; and ambient air measurements in a 2-mile radius of the airport. Emissions of contaminants from air transport operations and all related ground activities including motor vehicles, that contribute to the total atmospheric contaminant burden at the airport, were evaluated. Aircraft contributes 91% of the particulates and 44% of the carbon monoxide emissions. The CO emissions from ground operations were more than 55% of the total CO emissions from all sources. Oxides of nitrogen, organic gases, and sulfur dioxide were also measured.

24013 APTIC NO. 43858

Ginsburg, T. H.

SCRAP UTILIZATION BY SECONDARY ALUMINUM SMELTERS. *Bureau of Mines, Washington, D. C. and IIT Research Inst., Chicago, Ill., Proc. Miner. Waste Util. Symp., 3rd, Chicago, Ill., 1972, p. 269-273. (March 14-16.)*

Scrap utilization by secondary aluminum smelters is discussed with respect to types of aluminum scrap, economic value, receiving, sorting and processing of scrap, contaminants in scrap, and furnace, smelting, refining, and casting operations. Since contaminants in scrap contribute directly or indirectly to air pollution problems which create additional costs to the smelter, scrap contamination has a direct effect on cost and utilization of aluminum scrap. The day when virtually all scrap will require processing (shredding, drying, magnetizing, and compacting) may be close at hand if air pollution requirements become more stringent. At present, the impact of air pollution control in operating cost alone amounts to almost $.50/lb. The most important scrap contaminants are stainless steel, zinc, magnesium, and non metallics, such as paint, oil, plastics, insulation, and rubber, and other coatings. It is the nonmetallics which constitute the largest single source of air pollution to the smelter.

24014 APTIC NO. 44621

Govan, Francis A., Louis A. Terracciano, and Jerome Romm

SOURCE TESTING OF UTILITY BOILERS FOR PARTICULATE AND GASEOUS EMISSIONS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 23p., 1972. (Presented at the Air Pollution Control Association, Annual Meeting, 65th, Miami, Fla., June 18-22, 1972, Paper 72-72.)*

An emission test program was conducted with the cooperation of several commercial testing organizations to evaluate the best particulate control techniques available for installation on new or substantially modified steam-generating systemm. A total of 10 steam generators were tested for particulate, sulfur dioxide, and nitrogen oxides emissions. Public Health Service and ASME particulate emissions tests were performed concurrently for seven of the units. The average particulate emissions for the six coal fired steam-electric units tested were 0.21 and 0.09 lb/mill Btu of heat input by the PHS and ASME test methods, respectively. The average particulate emissions for the two oil fired steam-electric units tested were 0.12 and 0.06 lb/mill Btu of heat input by the PHS and ASME, test methods respectively. The average particulate emission for the 2 coal-fired industrial boilers tested were 0.11 and 0.02 lb/mill Btu of heat input for the PHS and ASME methods, respectively. A presurvey for the purposes of establishing liaison, setting operating parameters, outlining scaffolding requirements, checking sampling port conditions, and location of a clean-up area are a mandatory requisite for a valid test program. Recommended testing procedures are discussed.

24015 APTIC NO. 44227

Harmsen, Hans

WHAT IS EACH INDIVIDUAL S CONTRIBUTION TO ENVIRONMENTAL POLLUTION? (Was traegt der Einzelne zur Belastung der Umwelt bei)? Text in German. Staedtehygiene (Uelzen/Hamburg), 23(7):161-164, July 1972.

Cars have become the number one air polluter. The carbon monoxide concentration which accumulates during traffic rush hour is already so high that it impairs the capacity of the driver. While all hydrocarbons, carbon monoxide, and the oxides of nitrogen are dissociated through solar radiation, the lead additive to the fuel which is emitted cannot be destroyed and thus tends to be stocked in the environment. The reduction of the lead concentration in the fuel is no real help, although such a step is to be welcomed. A real solution would be provided solely by the development of an electric drive.

24016 APTIC NO. 44031

Hart, F. E., N. C. Baker, and I. Williams

CRG ROUTE TO SNG. *Hydrocarbon Process., 51(4):94-96, April 1972.*

The British Gas Council s catalytic rich gas (CRG) process, which produces methane from light hydrocarbon feedstocks, provides an easy route to substitute natural gas (SNG) for supplemental supplies. The process is based on reforming desulfurized feed with steam at high pressure and low temperature to produce a gas suitable for pipeline use. Two modifications of the process are possible, both of which consist of combinations of desulfurization, methane rich gas production, methanation, and Btu adjustment. In Method A, all the feed is charged to the first stage reactor yielding a methane rich gas which is further reacted to produce more methane rich gas which is further reacted to produce more methane. In Method B, hydrogasification can be used where the desulfurized feed is split equally between a conventional first stage reactor and the hydrogasifier which operates in series. Method B offers higher plant efficiencies through decrease in overall steam/feed ratio. Where gas of maximum heating value is needed a third stage reactor is used. The handling of waste gases and waters is mentioned, as well as mechanical design of the process.

24017 APTIC NO. 43994

Kowalchuk, Arthur

MOLECULAR SIEVE SWEETENING OF PROPANE AND BUTANE. *J. Petrol. Technol., vol. 25:540-544, May 1972. (Presented at the Society of Petroleum Engineers, Annual Fall Meeting, 46th, New Orleans, La., Oct. 3-6, 1971, SPE Paper 3626.)*

Three of the seven major gas plants which Gulf Oil Canada operates in Alberta are sour gas plants that yield propane and butane products in addition to sales gas, sulfur, and condensate. The decision to replace the regenerative caustic sweetening system with the molecular sieve system was prompted by problems related to vapors from regeneration of the caustic system, as well as by pollution, operating, and maintenance problems resulting from disposal of the spent caustic. The molecular sieve is a granular dry dessicant material manufactured from zeolites to trap particular molecules such as hydrogen sulfide, carbonyl sulfide, and mercaptan sulfins, and allow other molecules such as paraffin hydrocarbons to pass through the bed. Design features of the molecular sieve beds, general operating problems, and a sampling and analysis program are discussed.

24018 APTIC NO. 44067

Leach, J. F., P. Wardman, and B. E. Jocelyn

THE GROWTH IN STRATOSPHERIC FLIGHT. *Preprint, American Meteorological Society, Boston, Mass., 7p., 1972. (Presented at the International Conference on Aerospace and Aeronautical Meteorology, 1st, Washington, D. C., May 22-26, 1972.)*

Aircraft emissions in the stratosphere are estimated from all types of aircraft. The contribution of subsonic aircraft to stratospheric water vapor will be comparable to that of supersonic aircraft at least as late as 1980, although their contribution to nitrogen oxides will be somewhat smaller. Even in 1990, the fuel burned in the stratosphere by subsonic aircraft will still be half that of the SST aircraft. Transfer on materials from the troposphere to the atmosphere by the Hadley Cell mechanism is discussed.

24019 APTIC NO. 43786

Matsumoto, S. and Y. Takashima

THE PRESENT RESEARCHES AND PROBLEMS OF HIGH SPEED FURNACE REACTOR AEROSOLS. *(Kosokuro earozoru no kenkyu genjo to mondaiten). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 10(2):23-26, June 1972. 16 refs.*

A general discussion on research on sodium, uranium, and plutonium aerosols of a high speed furnace reactor is given. Sodium oxide aerosols were sprayed by burning Na, and the decreases of aerosol concentration, sticking velocity on a wall and precipitation velocity on a bed of aerosols were studied using initial oxygen concentration, amount of Na discharged and time as the parameters. The Aerosol concentration reaches the maximum only few minutes after the beginning of spray, and the higher the maximum Na2O aerosol concentration is, the faster the decrease of the concentration. The latter is also true for uranium oxide aerosol. Relations between the half-value period of the initial concentration, the height . the container and the weight concentration of the aerosols were derived into equations. Pure plutonium generates plutonium oxide aerosol faster than delta-alloy, and the rate is even faster in an atmosphere saturated with water vapor. At 500 C, the rate is independent of the oxygen concentration, and it becomes dependent on O2 concentration from 700 C.

24020 APTIC NO. 43876

Maugh, Thomas H., II

CARBON MONOXIDE: NATURAL SOURCES DWARF MAN'S OUTPUT. *Science, 177(4046):338-339, July 1972 3 refs.*

While localized buildup of carbon monoxide in cities may represent a serious health hazard, man's CO production is relatively insignificant when considered on a global basis. By analyzing the isotopic composition of CO samples collected at many locations and at various times of the year, a team from Argonne National Laboratory was able to trace the origin of several different species of CO. By comparing the average isotopic composition of atmospheric CO with that of a CO species whose production rate is known, they could then estimate the production rates of other species. Thus, evidence is provided that natural sources produce more than 3.5 billion tons of CO/yr in the Northern Hemisphere alone, or more than 10 times the amount produced by man. Methane, degradation of chlorophyll, and the primarily anthropogenic sources of CO are discussed. The production of CO from automobile emissions and fuel combustion for residential heating is enhanced in the winter.

24021 APTIC NO. 43710

Melick, F. A. W. H. van

ELECTRICITY SUPPLY IN OUR SOCIETY AND ITS INTERACTION WITH THE ENVIRONMENT. *(De elektriciteitsvoorziening in onze samenlevning en haar wisselwerking met het milieu). Text in Dutch. Ingenieur, 84(1):A3-A9, Jan. 1972.*

The consumption of electricity doubles every 6-12 years in the Netherlands. The bulk of electricity is generated in steam turbines, and to a smaller extent in gas turbines and nuclear power plants. Oil and natural gas are the most important present and prospective sources of energy, with coal consumption by power plants showing a downward trend. The maximum allowable sulfur content in oil is 3.5% which should be decreased to reduce sulfur dioxide emissions. Sulfur dioxide and nitrogen oxides are the basic pollutants emitted by power plants. The erection of high stacks is regarded as one of the most effective means of avoiding high pollutant concentrations. Thermal pollution along with its biological effects is discussed. Existing thermal power plants have an efficiency of 40% at steam temperatures of 540-570 C and pressures of 180-250 bar. Radioactive pollution produced by nuclear power plants and other nuclear facilities is negligible compared to the natural background. Magnetohydrodynamic, total energy and other power-generating techniques and their respective advantages and uses are described. The environmental hazards involved in conventional and nuclear power plants can be reduced to acceptable levels.

24022 APTIC NO. 44186

Menke-Glueckert, Peter

THREE MODELS OF THE FUTURE. *(3 Modelle Zukunft). Text in German. Umwelt (Duesseldorf), 2(3):32-34, June/July 1972.*

Three different models of the future are described with regard to the interrelations between society, energy production, and environmental protection. A Japanese model of the fully automated, four-channel society predicts optimum use of all technical possibilities at the expense of squandering energy resources. All environmental nuisances would be controlled by adequate technical measures, and the elimination of wastes would be connected with energy production. A USA model seeks to solve all problems in the world by unlimited use of nuclear energy, and advocates underground cities with waste elimination in closed cycle. Another model, conceived by Norwegian and Chinese scientists, lacks the touch of gigantomania, characteristic of the above models. Reasonable technical and economical development, limited by biological and ecological necessities, and harmony of man and nature are envisioned. Energy would be supplied by a large number of fuel cells and solar batteries instead of by large nuclear power plants. All three models ban gasoline-engined automobiles.

24023 APTIC NO. 43744

Mimura, Kazuo, S. Yoshimura, S. Yamada, and A. Hiei

ON DEVELOPMENT OF ELECTRIC AUTOMOBILE - I. *(Denki jidosha no kaihatsu ni tsuite - sono I). Text in Japanese. Kansai Denryoku K. K. Giken Hokoku (Tech. Inst. Kansai Elec. Power Co., Inc., Rept.), no. 9:216-229, March 1972.*

Daihatsu electric automobiles and innovations made in the course of electric automobile development since introduction in Nov. 1966 of the first electric automobile are discussed. The performance characteristics and/or construction of the main component units such as the motor, the battery, and the main circuits including the thyristor chopper and regenerative braking are discussed. The battery meter and room heater specially designed for use with the electric automobile are shown. Performance of the models were evaluated and the problems involving them brought up. For example, the problems found after the practical test of the first model included: insufficient acceleration; a question of practicability of accelerator for passing and of regenerative braking system; short drive range per charging and battery breakage due to improper mounting; safety measures needed for the thyristor chopper control system; practicability of the high-rate charger. The results of the test drives are also tabulated.

24024 APTIC NO. 43806

Muroki, Takumi

EXHAUST GAS CONTROL OF MAZDA ROTARY ENGINE. *(Matsuda rotari enjin no haikigas taisaku). Text in Japanese. Nainen Kikan (Internal Combust. Engine), 11(123):31-34, May 1972. 2 refs.*

The emission characteristics of carbon monoxide, hydrocarbons, and nitrogen oxides from a Mazda rotary engine are discussed along with control measures. Reviewed in relation to the air/fuel (A/F) ratio, the CO emission showed a greater deviation from the theoretical value at or about A/F equals 14.8, that is, lambda equals 1. The percent of CO did not equal zero even in the range of lambda being larger than 1. In the range of lambda being smaller than 1, the value tended to come closer to the theoretical value. The emission of hydrocarbons is three times as high as compared with a reciprocating engine while nitrogen oxides emission is only 1/3. A further analysis indicated that the CO concentration decreased at the terminal of the rotor's trailing, but that of oxygen increased. This indicates that the flame fails to reach the A/F mixture in the trailing terminal section. As to hydrocarbon emission, it increases drastically from about 180 after the bottom death center in the course of the rotor revolution, indicating hydrocarbons are mostly emitted from the trailing terminal section. The emission characteristics were also reviewed in relation to the ignition timing. The engine has two ignition plugs in one rotor housing, one in the trailing side and the other in the leading side. The CO concentration was unaffected by the ignition timing. Hydrocarbons decreased with a delayed ignition timing of both plugs. The use of one plug gave a greater decrease of hydrocarbons due to the after burning that the one-plug system brings about. Nitrogen oxides emission characteristics have the same tendency as described for hydrocarbons. The thermal reactor designed to satisfy all the criteria for exhaust gas cleaning is described with its performance shown in a diagram.

24025 APTIC NO. 43739

Mushrock, M. J.

THE STEAM ENGINE: 50 YEARS AFTER STANLEY. *Automotive Ind., 147(2):47-50, July 15, 1972.*

An interview is presented with Lawrence C. Hoagland, vice president and director of research of Steam Engine Systems Corp., concerning the differences between today s steam technology and that of 50 years ago. One of the principal differences is that today steam powerplants for automobiles must compete with well-developed gasoline engines. This means that they must be comparable in size, weight, cost, and all aspects of performance. Major considerations have involved boiler design and control of the powerplant. The combustor and vapor generator are built into a unitary package which is separate from the expander. Start-up time, a step-up gear, fuel economy, and the economic feasibility of producing a steam engine are mentioned. Emissions are about a factor of ten below the 1975 standards on hydrocarbons and on carbon monoxide, and a factor of two below the 1976 standards for oxides of nitrogen. How the water is stored and what keeps it from freezing are also indicated.

24026 APTIC NO. 44099

Norden, H.

BALANCE IN THE HEATING SECTOR. *(Bilanz im Heizungswesen). Text in German. Oel Gasfeuerung, 17(7):565-570, July 1972.*

The world oil consumption was 2.44 billion tons in 1971, and thus was 6% higher than in the previous year. In 1970 the growth rate was 9%. The gross consumption of natural gas was less than 1/5 of the fuel oil consumption. Multi-component burners will gain importance. These are burners which operate alternately with fuel oil, gas, or pulverized coal. The demands for lower sulfur dioxide, particulates, and hydrocarbons will rise. The concern about environmental pollution has renewed the interest in combustors. They emit a minimum of nitrogen oxides. The artificial waste gas recirculation is also a method increasingly employed for reducing the emissions of soot and fly ash.

24027 APTIC NO. 43776

Ohba, Hideki

MORE RESTRICTIONS ARE REQUESTED ON AUTO-EXHAUST. *(Jidosha no motarisu osen mondai — isogareru jidosha haishutsu gasu no kisei). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 8(7):641-653, July 1972. 17 refs.*

There were more than 1,700,000 automobiles in Japan in the year 1970, almost three times that in 1965. Statistics show that 99.7% of the carbon monoxide, 97.9% hydrocarbons, 35.9% nitrogen oxides, and about 1% sulfur oxides in air resulted form automotive exhaust. The carboxylhemoglobin concentration in the blood of nonsmokers increases 2.0 to 2.5% after being exposed to 10 to 15 ppm of CO for more than 8 hours and a high concentration of nitrogen dioxide causes edema of the lung. The lead content in blood of human beings increases as that in air increases. From July 1972, the maximum of volatile HC has been restricted at 2 g/test and from Oct. 1972, that of CO concentration in exhaust at idling decreased to 4.5%. From April, 1974, non-leaded gasoline will be supplied. The improvements of the gasoline will be supplied. The improvements of the gasoline engine and the development of alternative engines are also discussed.

24028 APTIC NO. 44142

Schiele, E. and E. Kanert

DEVELOPMENT OF BURNING PROCEDURE IN A MODERN LIME WORK. *(Entwicklung des Brennbetriebes eines neuzeitlichen Kalkwerkes). Text in German. Zement-Kalk-Gips (Wiesbaden), 25(6):298-301, June 1972.*

Because of the continuing depletion of available supplies of workable high-grade limestone, it is necessary to process the stone in kilns which are so operated and so designed as to enable different particle size fractions to be burned and the cheapest fuels to be used. In the last 14 years, the Stolberg lime manufacturing plant has replaced the old Aachen funnel-type kiln by modern coke-fired shaft kilns and oil-fired double inclined kilns. The rise in the cost of coke and the endeavour to use all available material particle size fractions in the burning process subsequently led to the conversion of one of these shaft kilns into an oil-fired annular shaft kiln. In the last three years the remaining shaft kilns have been converted to partial oil-firing by means of impulse burners. This development is described, and the question of cost is considered. (Author summary modified)

24029 APTIC NO. 44163

Schuler, M. and L. Borla

PVC AND AIR HYGIENE. *(PVC und Lufthygiene). Text in German. Chem. Rundschau (Solothurn), 25(2):17-18, Jan. 12, 1972. 10 refs.*

Investigations of trends in polyvinyl chloride use and hydrochloric acid emissions from waste incinerators handling PVC are reviewed. About 5% of the total volume of plastics consumed in Switzerland in 1969 was made up of PVC. By 1980, domestic waste in Switzerland is expected to contain some 1.1% of PVC corresponding to about 3.5 kg/capita. Comparable figures are forecast for Sweden, and 1-1.5% is predicted for West Germany. Waste gases from a waste incinerator contained 1.4 kg of HCl, corresponding to 0.24% of PVC, 0.008 kg of chlorine, 1.6 kg of sulfur dioxide, 0.07 kg of nitrogen dioxide, and 0.5 kg of nitric oxide/ton of waste. Small quantities of methyl and vinyl chlorides, but no phosgene, were also detected. Waste incinerators with chimney heights designed for maximum allowable SO2 concentration are able to handle a maximum of 7% of PVC without causing health hazards due to HCl. The results indicate that air pollution due to the incineration of PVC and to waste incineration in general is negligible.

24030 APTIC NO. 43995

Shaw, H., W. F. Taylor, C. J. McCoy, and A. Skopp

CONTINUOUS MEASUREMENT OF EXHAUST EMISSIONS FROM A HIGH PRESSURE CANNULAR COMBUSTOR. *Preprint, American Society of Mechanical Engineers, New York, 7p., 1972. 14 refs. (Presented at the American Society of Mechanical Engineers, Gas Turbine and Fluids Engineering Conference and Products Show, San Francisco, Calif., March 26-30, 1972, Paper 72-GT-88.)*

A high pressure cannular combustor was developed to simulate aircraft turbine engine emissions. In conjunction with this combustor, a continuous analytical and sampling system was assembled. This system is capable of complete on-the-spot analysis of carbon dioxide, oxygen, carbon monoxide, water, unburned hydrocarbons, and oxides of nitrogen. Total hydrocarbons are measured with a flame ionization detector, carbon dioxide with a nondispersive infrared analyzer, carbon monoxide with an infrared analyzer, and oxygen with a Beckman oxygen analyzer which operates on the principle of magnetic susceptibility. Water is determined on a thermal conductivity gas chromatograph employing a Poropak Q column. Nitrogen oxides are measured with a faradic device with replaceable fuel cell sensors; the gas is absorbed in a surface film, and the oxidation/reduction voltage signal produced is proportional to pollutant concentration. The measured emission levels obtained from burning Jet A are in good agreement with those reported from operating aircraft turbine engines. Data showing the effect of equivalence ratio and pressure on the concentration of combustion products are presented. (Author abstract modified)

24031 APTIC NO. 44114

Stadelmann, M.

HEATING AND AIR CONDITIONING WITH GAS. *(Heizen und Klimatisieren mit Gas). Text in German. Chem. Rundschau (Solothurn), 25(11):299, March 1972.*

In Switzerland, the annual growth rate for gas heaters is about 30 to 40%. In other countries the growth rate is even higher. One of the major advantages of gas heating is that it causes no air and water pollution. Gas burns smoke and soot-free. At the combustion of both liquid and solid fuels, SO2 is liberated. Most of these fuels also emit considerable quantities of soot. At the combustion of natural gas carbon dioxide and water vapor develop, both are harmless and natural gases. A look at the sulfur concentrations produced by that fuel quantity which yields a heat of 10,000 kcal showed the following fractions to be obtained for the individual fuels: 14.0 g for hard coal, 5.0 g for light fuel oil, 0.1 g for city gas, and 0.0 g for natural gas.

24032 APTIC NO. 44010

Stumm, Werner

THERMAL POLLUTION AND POWER CONSUMPTION AS ECOLOGICAL LIMIT FACTORS. *(Waermebelastung und Energiefluess als oekologische Begrenzungsfaktoren). Text in German. Schweiz. Bauztg., 90(23):544-546, June 1972.*

Switzerland plans the construction of 20 to 30 new power plants over the next thirty years. The problem of thermal pollution thus deserves great attention. The entire produced power is discharged into the environment (rivers or atmosphere) after several conversions. Even minor temperature changes affect the life cycles and regulating factors of an ecological system. A rise of the water temperature by 3 C for instance produces the excessive growth of blue algae which replaces the green algae; also certain fish parasities begin to thrive. The energy consumption of modern man today is about 79,000 kcal/day. It can be expected that the world-wide energy consumption will soon be higher than the energy produced by photosynthesis. In order to prevent a further exponential increase of the energy consumption, extensive plans on the use of all forms of energy (coal, natural oil, natural gas, and nuclear fuels) are required in addition to environmental protection laws.

24033 APTIC NO. 44268

Suzuki, Shin

ACTUAL SITUATIONS OF AIR POLLUTION. *(Taiki osen no genjo (Sangyo kogai to sono keikaku)). Text in Japanese. Hyojunka to Hinshitsu Kanri (Standard. Qual. Control), 25(5):1-7, May 1972. 10 refs.*

Pollutants include sulfur dioxide, carbon monoxide, ozone, nitrogen dioxide, nitric oxide, and hydrocarbons resulting from photochemical reactions. Exhausted amounts of SO2 reach 73 times 10 to the 6th power tons. Sulfur emitted as a pollutant equals about 40% of the total amount of exhausted sulfur on the earth per year. Oxidant-causing photochemical smog forms mists when it reaches about 0.4 ppm, but affects human bodies and plants when it reaches 30 ppm or more. The SO2 is converted into sulfur trioxide and sulfuric acid mists by a reaction on organic compounds or by a reaction with nitrogen trioxide. With the unsaturated hydrocarbons and the sunlight at high temperatures, NO changes into NO2, which forms NO3 in reaction to ozone. Thus, rapid technical development for preventing nitrogen oxides or hydrocarbons is needed.

24034 APTIC NO. 44199

Traupel, W.

THERMAL EMISSIONS BY LARGE POWER PLANTS. *(Thermische Emissionen grosser Waermekraftwerke). Text in German. Schweiz. Bauztg., 90(21):483-484, May 1972.*

Problems of thermal emissions from large power plants and possible solutions are reviewed. Thermal emissions from fossil-fueled power plants account for about 150% of the electric energy produced and emissions from nuclear plants for 200%. Cooling towers, evaporative or dry, represent the only applicable cooling process at the present time. The disadvantages involved in evaporative cooling towers (discharge of mist and water droplets) can be reduced by effective droplet separators. The dry type towers require a very large cooling area. The development of high temperature reactors will represent a major achievement regarding both cooling efficiency and waste heat utilization. Though waste heat recovery from steam and gas turbines is theoretically possible, its attainment is associated with several problems. Developments aimed at reducing the amount of waste heat at power plants are, though requiring expensive research, possible in principle. The direct conversion of fossil fuel to energy is not yet feasible on an industrial scale.

24035 APTIC NO. 44248

Volk, Fred

NO FORMATION DURING COMBUSTION PROCESSES. *(NO-Bildung bei Verbrennungsvorgaengen). Text in German. Umschau (Frankfurt), 72 (14):464-465, July 1972. 5 refs.*

Nitrogen oxides are produced during combustion in internal combustion engines, jet engines, and gas turbines. Studies of toxic products present in exhaust gases have received publicity as part of the current effort to reduce air pollution. However, a better understanding of how NOx are formed is necessary to be able to reduce these toxic products. A method capable of theoretically assessing NOx formation in the millisecond region is presented. The nitric oxide concentration of the combustion gases largely depends on the fuel to air ratio, the type of engine, the ignition timing, and the compression ratio. The two Zeldovich reactions describe NO formation in Otto engines with sufficient accuracy. Experimental investigations revealed that NO is not formed in the flame itself but immediately behind the flame front. None of the NO dissociation reactions is fast enough to reduce the NO concentration in the exhaust gas. Presently two methods are available for reducing the NO concentration in the exhaust gases of piston engines, namely thermal and catalytic afterburning. The methods of catalytic afterburning, of which there are three, are more efficient. All methods require further development.

24036 APTIC NO. 43801

Vuillemin, Emile

THE ACTIVITY OF GAZ DE FRANCE IN AIR POLLUTION PREVENTION. *(L action de Gaz de France dans la prevention de la pollution atmospherique). Text in French. Pollut. Atmos. (Paris), 14(54): 142-144, April-June 1972.*

The activity of Gaz de France in air pollution prevention is outlined. The absence of dust, sulfur and other pollutants and inexpensive transport, handling, distribution and storage, primarily in underground cavities, are the basic advantages of natural gas. The transportation costs are three to five times lower, and the costs of distribution seven to nine times lower for natural gas than for electric energy. The amount of nitrogen oxides formed during combustion is dependent on the flame temperature, very small, and much less than that formed from liquid or solid fuel. The use of natural gas for domestic and other heating as well as industrial purposes is promoted. Studies on the utilization of natural gas in transportation and on fuel cells are being made in the USA.

24037 APTIC NO. 44200

Wagner, Manfred

FORK LIFT TRUCKS. WHERE IS WHAT DRIVE IMPORTANT? CHECK LIST FACILITATES SELECTION. *(Gabelstapler: Wo ist welcher Antrieb richtig? Checkliste erleichtert die Auswahl). Text in German. Foerdern Heben, 22(7):347-353, June 1972. 3 refs.*

Selection criteria for fork-lift trucks are reviewed with special regard to indoor air pollution. Some 40% of fork-lift trucks now in use have electric drive, 50% diesel engine drive, and 10% Otto engine drive, powered usually by fuel gas. The production of electric fork-lift trucks declined slightly during the past few years. Gasoline engine drives, emitting exhausts with 0.1-10% carbon monoxide by volume, must not be used in closed shops. Though the CO concentrations as caused by diesel and fuel-gas drives are far below the maximum allowable level of 0.005% due to intense dilution, the use of electric drives in small, closed shops and in areas where clean air is required is absolutely necessary. Results of exhaust measurements on diesel engines equipped with the BKS-type exhaust control device are presented. While CO concentrations in nondiluted exhaust (0.005-0.01% at idle and 0.02- 0.05% under full load) were not affected by the device, nitrogen oxides concentrations decreased from 0.1-0.7 mg/l, and the soot contents was reduced by 66-75%. The concentration of formaldehyde vapors decreased from 0.005-0.002 mg/l at idle and from 0.05-0.005 mg/l under full load.

24038 APTIC NO. 43912

Winkler, Hans-Dieter and Klaus Welzel

STUDIES OF THE FORMALDEHYDE EMISSION FROM THE PRODUCTION OF WOODEN BOARDS. *(Untersuchung ueber Formaldehyd-Emissionen bei der Herstellung von Spanplatten). Text in German. Wasser Luft Betrieb, 16(7):213-215, July 1972. 4 refs.*

For the production of wooden boards, binding agents (urea formaldehyde) are required which evaporate during the pressing and subsequent cooling process. The formaldehyde emissions from this process were measured by drawing off part of the gas flow (1.5 l/min) and by absorption in 40 ml ice-cold 1% $NaHSO^3$ solution. The method by Goldmann and Yagode was used. The measurements were taken at four different points. The plant where the emission measurements were taken operated with pressing temperatures between 150 and 160 C, and the pressing time was 5 minutes. The plant s capacity was 470 cu m boards/day. The total waste air quantity amounted to about 110,900 cu m/hr. Six ventilators were used. Parallel to the individual measurements, a continuously recording flame ionization detector was used at two measuring points. The glue consumption was also determined. Based on the glue consumption, the formaldehyde emission amounted to 0.46%, on the average. The standard deviation of the individual values was + or 0.034%. According to the VDI-guideline 2280 the maximum allowable emission concentration for formaldehyde at an emission quantity of 5 kg/hr is 20 mg/cu m. This limit is far exceeded by the board presses. Waste gas cleaning plants must be established. The following methods are suitable: thermal or catalytic afterburning, scrubbers, and absorption on surface active substances.

24039 APTIC NO. 44279

Zimmermann, M.

COMBUSTION - BOILER - STACK SHOULD BE COORDINATED. *(Feuerung - Heizkessel - Kamin, ein Zusammenspiel). Text in German. Technica, 21(11):947-952, May 1972.*

Like in many other fields there is a tendency today, as far as modern heating systems are concerned, to coordinate the combustion, the boiler design, and the stack design. Usually boilers for home heating are operated with light fuel oil. At the combustion of this fuel oil its components carbon, hydrogen and sulfur react with oxygen and carbon dioxide, and at insufficient air supply carbon monoxide, water, and sulfur dioxide. Through auto-oxidation sulfur trioxide is formed. The most important factors which influence the SO3 formation are the combustion chamber temperature, the air surplus, the sulfur concentration, and the presence of catalysts which favor the reaction. The modern burners are equipped with automatic flame supervision and control units. According to the recommendations by the Swiss Commission on Air Hygiene, the Bacharach soot number of three may not be exceeded at the combustion of extra-light-fuel- oil. For continuous operation a Bacharach soot number of one to two should not be exceeded. High capacity boilers are nowadays mostly used because much heat has to be produced in a relatively small place. The high boiler efficiency requires a smaller stack cross section. For an overpressure boiler with a capacity of 1,150,000 Kcal/hr and a stack height of 28 m, the stack diameter must be 45 cm.

CONTROL METHODS

24040 APTIC NO. 43734

HOW TO RUN A SHUTTLE CAR ON DIESEL POWER...WITHOUT ANY POLLUTING EXHAUST FUMES. *Coal Age, 77(2):120, July 1972.*

A novel way of recirculating and nullifying the exhaust fumes of combustion engines is the basis for a new concept in diesels. Developed originally by Aerojet Liquid Rocket Co. for use in powering underseas craft, the exhaust free closed-cycle diesel is displaying many potential advantages for underground coal mine operations. The system operates without any intake of air or exhaust. An oxygen tank takes care of the intake, and a treatment unit consisting of 49% aqueous potassium hydroxide solution takes care of the carbon dioxide. The treated exhaust then goes right back to the intake. The KOH is transformed to a liquid potassium carbonate which has some resale value for fertilizing. Other advantages of the closed-cycle diesel power system are mentioned.

24041 APTIC NO. 43761

ON LATEST GAS SCRUBBING TYPE DESULFURIZATION PROCESS. *(Saikin no gasu senjo datsuryu purosesu ni tsuite). Text in Japanese. Aromatikkusu (Aromatics), 24(3):129-138, March 1972. 52 refs.*

Breaking down the gas desulfurization processes into five groups, a general description is given to the respective categories of the processes, followed by detailed descriptions of the representative processes of each group. The groups are the chemical reaction process, the physical reaction process, the direction reaction process, the dry type fixed bed process, and the process using special solvents. The monoethanolamine chemical process features a high reaction with hydrogen sulfide, comparatively low cost of the solvent, high water solubility, easier regeneration by means of a reclaimer, less hydrocarbon content in the removed acid gas, and lower construction cost. The disadvantages include deterioration of the solvent in the gas containing carbonyl sulfide, carbon disulfide, and oxygen, and the inability to remove mercaptans or selectively remove H2S if accompanied by carbon dioxide. The diethanolamine chemical process is advantageous over the monoethanolamine process for less solvent deterioration in COS and CS2 gas and less evaporation loss. Low reaction, greater amount of solvent required in the circulation system, and higher cost of the solvent, are the disadvantages.

24042 APTIC NO. 43879

KAMLOOPS POLLUTION CURBS ARE B.C. S MOST EXTENSIVE. *Can. Pulp Paper Ind. (Vancouver), 25(7):21-25, July 1972.*

Weyerhaeuser Canada Ltd. s new 1250 tons/day bleached kraft pulp mill at Kamloops, British Columbia, brings into effect close use of the forest resource, as well as an extensive pollution abatement program. Beehive burners have in the past burned constantly, but now sawdust and shavings will be used for the production of sawdust market pulp, while hog fuel will also be shipped to the Weyerhaeuser pulp mill for use in hog fuel burning boilers where the mill will generate most of its own power. The mill was designed to burn off a high percentage of odorous gases and waste products, so that as little odor and effluent as possible are returned to the environment. Depending on the nature of the waste, it is burned in the lime kiln or power boilers. A gas containment system will collect blow gases from the digester so that noncondensable organic sulfur compounds can be separated out and then delivered to the lime kiln where they are burned. Burning of the sulfur compounds produces heat and reduces the amount of fuel required for the kiln. Sulfur dioxide is removed from the kiln flue gas by two wet scrubbers in series. Fly ash removal systems, water effluent treatment, a high level stack, and other pollution abatement techniques are indicated.

24043 APTIC NO. 43910

BURNING OF CHEMICAL REFUSE ON HIGH SEA.

(Chemie-Abfaelle auf hoher See verbrennen). Text in German. VDI (Ver Deut. Ingr.) Nachr. (Berlin), 26(23):1, June 1972.

In 1972 about 50,000 tons of chemical refuse containing chloride concentrations from 1 to 10% will have to be removed. A new method to dispose of this refuse is the incineration on special ships in the North Sea. A fire-proof furnace on the ship is heated up to 1000 C. By means of burners working with compressed air and a surplus of oxygen, the chemical refuse is injected into the furnace and burned at a temperature of 1450 C. A nearly complete incineration is reached so that the percentage of unburned substances in the flue gas is less than 0.1%. The flue gases contain the complete quantity of the aggressive and corrosive chloride. These gaseous chloride clouds settle on the surface of the North Sea and condense there, forming hydrochloric acid. Since the ship moves continuously during the incineration process, the pH-value of the sea water does not change very much. Theoretically, the HCl provides for the neutralization of the sea water, thus compensating for the influence of basic effluents. Harmful influences on fishes living in the sea water were not noticed. In 1971, about 27,000 tons of chlorinated hydrocarbon were burned on the ship. Costs for this incineration amount to approximately $25.00/ton.

24044 APTIC NO. 43990

AQUITAINE CLEANS CLAUS TAIL GAS WITH SULFREEN UNIT.

Oil Gas J., 70(26):85-88, June 26, 1972. 1 ref.

The new Ram River gas plant of Aquitaine Co. of Canada Ltd. is now operating the first commercial scale cleanup unit for Claus tail gas in North America. Addition of the Sulfreen cleanup unit made it possible to construct only a two-stage Claus plant, rather than a four-stage operation which otherwise would be necessary. The process converts hydrogen sulfide and sulfur dioxide in the tail gas to sulfur at low temperatures, 260-300 F. A special activated charcoal was used as adsorbent and catalyst, while an alumina based catalyst is being considered for the next Ram River unit. Inlet gases to the unit pass through four of the six parallel reactors which operate on a regenerative cycle. A reactor remains on line until it approaches the sulfur adsorbing capacity of the catalyst. Then, it is regenerated with hot, inert gas. Standard sulfur condensers cool the regeneration gas and its load of sulfur vapor. The supervisory control system which keeps close watch on certain processing variables so that most upsets can be quickly detected and rectified is described. Materials balance, optimizers, gas flow through the plant, pollution control, and the electrically heated sulfur flow line are discussed.

24045 APTIC NO. 44018

BENICIA AIMS FOR LOW FCC CAT LOSS.

Oil Gas J. 70(27):46-47, July 3, 1972.

Humble Oil and Refining's Benicia, California, refinery includes a fluid-catalytic cracking unit and a fluid coker. The cat-cracker regenerator and coker burner are each equipped with two stages of cyclones for removal of particulates from the flue gases. The effluent gas streams from the cyclones are combined and burned in two carbon monoxide furnaces that provide preheat for the atmospheric and vacuum pipe-still distillations. In addition to oxidation of the carbon monoxide, the furnaces burn some of the coke particles that are entrained in the gas from the coke burner. The flue gases from the two furnaces combine and flow to a three section electrostatic precipitator for the final particulate removal step. The multisection unit permits removal of one section from operation for maintenance while gas cleanup continued in the other two sections. The system was designed to reduce total particulate emissions to about 1 ton/day and to limit the opacity of the stack plume to a Ringelmann of No.2 or less. Baffles and other modifications which were required to meet these design levels are mentioned.

24046 APTIC NO. 44097

DEVICE FOR REPLACING FILTER CELLS OF AIR FILTERS FOR THE COLLECTION OF PATHOGENIC DUSTS.

(Vorrichtung zum Auswechseln von kastenfoermigen Filterzellen bei Luftfiltern fuer die Abscheidung gesundheitsschaedlicher Staeube). Text in German. Wasser Luft Betrieb, 16(7):242, July 1972.

A new replacement device for filter cells laden with bacteria and other toxic dusts is described which consists of a cylindrical shaft in which is sealed a hollow piston-type loader. It moves inside the tightly sealed off shell. There are recesses diametrically opposite each other for the entry of the uncleaned air and the exit of the cleaned air. A filter cell is installed between the recesses. The shell in which the piston moves is twice as long as the piston itself so that apart from the filter in operation another one can be inserted before the dust-laden filter is pushed on. The filter cells rest air-tight in the loading piston and can be removed from them without ever being exposed to the ambient air.

24047 APTIC NO. 44130

CLEAN FUEL GAS FROM COAL GASIFICATION.

Chem. Process. Eng., 53(2): 62-63, Feb. 1972.

The clean fuel gas concept developed by Lurgi and based on their pressure gasification process is intended to make the best use of natural coal resources without the associated difficulties of removing ash and sulfur oxides from stack gases. Gas produced by the pressure gasification of coal is cleaned and desulfurized, and then expanded from about 250 psi to be burned as a fuel in furnaces, steam boilers, or advanced power cycles. Expansion of the gas through an air compressor turbine supplies additional excess energy, since the gas volume to be expanded is greater than the volume of air to be compressed. Gasification, desulfurization, the expansion turbine, and gas utilization are discussed. The gas is first cooled before being desulfurized. The desulfurization process consists of an Alkazid wash to remove hydrogen sulfide from the gas and a Claus kiln to convert the hydrogen sulfide to elemental sulfur.

24048 APTIC NO. 44187

STUDY GROUP EMISSIONS FROM CASTING PLANTS (ENVIRONMENT PROTECTION).

(Fachausschuss Emissionen aus Giessereien (Umweltschutz)). Text in German. Giesserei (Duesseldorf), 59(9): 302-303, May 1972.

Current problems of foundries in air pollution control are reviewed with regard to the activity of the Study Group Emissions from Casting Plants. The relationship between coke throughput and dust emissions from cupola furnaces was studied. The dust emission from new cupola furnaces is limited to 1.5 kg/t of iron, and to a maximum of 2 kg/t for adverse cases. Dust measurement procedures were standardized. A suggested reduction of the maximum allowable dust concentration in foundries, from 150 to 175 mg/N cu m, is not feasible due to the limited performance of primarily tissue filters. Bag filters and wet type dust separators make, however, a limit of 100 mg/N cu m appear realistic. The catalytic afterburning of waste gases, suggested for core shops, is technically and economically not feasible. Dust separation is required for induction furnaces for which the dust emission standard is set presently at 150 mg/N cu m.

24049 APTIC NO. 44191

BURNER FOR WASTE PRODUCTS. *(Brenner fuer Abfallbeseitigung). Text in German. Erdoel Kohle (Hamburg), 25(6):363-364, June 1972.*

A new high-capacity burner has been developed which burns both solid as well as liquid waste material without soot production. The combustion air is supplied tangentially and can be adjusted according to need. The waste gas is returned for further combustion. The flame stability of the burner permits a wide fluctuation of the heating value and of the quantity of the waste material. Everything from tarry waste products and chlorine containing material to organically loaded waste air or waste gas can be burned. For the burning of waste material with low heating value, fuel oil or gas is used as auxiliary fuel. The quantity of auxiliary fuel which is required can be controlled by the temperature in the reaction chamber. The burner comes in various sizes for capacities ranging from 400,000 to 20 million kcal/hr.

24050 APTIC NO. 44215

WET COLLECTORS FOR FOUNDRIES. *(Nassabscheider fuer Giessereien). Text in German. Giessereipraxis, no. 11:202, 1972.*

A wet venturi-type dust collector used in a foundry is described. The air to be treated is admitted tangentially to the lower part of the separator, where preliminary dust separation takes place in a wet cyclone having a water-mist zone for the separation of coarse particles. The wet air is then passed through venturi tubes where more water spray is added. The gas-water mixture is separated in a centrifugal water separator in the upper part of the unit. The separated water is recycled.

24051 APTIC NO. 44218

FILTER BAGS OF NOMEX FIBER SOLVE THE PROBLEM OF AIR POLLUTION IN LIMESTONE FACTORIES. *(Filterschlaeuche aus Nomex Fasern loesen das Problem der Luftverschmutzung in Kalkwerken). Text in German. Tonind. Ztg. Keram. Rundschau (Goslar), 96(6):159, June 1972.*

Filter bags used at a limestone factory are described. The bags are made of Nomex, an aromatic polyamide (needle-punched, specific weight 500 g/sq m). They have an average life of 1-1.5 yrs at a gas temperature of 220 C (maximum 260 C), while the resistance is 170 mm water column. The filter, designed for a capacity of about 33,000 cu nm/hr, is composed of 14 filter chambers containing 252 bags each, which adds up to a filter area of 518 sq m/chamber. The bags are 3300 mm long and 200 mm in diameter. The residual dust concentration is 70 mg/cu nm. The dust is removed by periodic vibration with countercurrent air flow.

24052 APTIC NO. 44231

UNIT FOR DRAWING OFF THE DUST DEVELOPING AT MECHANIZED STONE DRILLING. *(Staubabsauggeraet fuer mechanisiertes Gesteinbohren). Text in German. Schweiz. Bauztg., 90(28):681-682, July 1972.*

The dust exhauster comprises a dust suction device above the drilling hole and a cyclone. The drawn-off dust is passed through a hose to the cyclone. In the cyclone the coarse dust is first separated and then retained in 18 tubular filters. The filter volume is 9 sq m. The filter is automatically cleaned by two vibrators. The dust is collected in plastic bags. The entire unit weighs 250 kg, its suction force is 25 cu m/min. The equipment is extremely efficient even for dust with a grain size of less than 5 micron. It is attached to the drill so that the view into the whole remains unobstructed.

24053 APTIC NO. 44249

SO2 REMOVAL TECHNOLOGY ENTERS GROWTH PHASE. *Environ. Sci. Technol., 6(8):688-691, Aug. 1972.*

More than two thirds of the 33 million tons of sulfur oxides emitted to the atmosphere in 1969 came from stationary sources. Some 17.7 million tons came from steam-electric power plants. For large new power plants using liquid fossil fuels, standards for sulfur dioxide are 0.80 lb SO2 emitted for each million Btu of heat output. For plants using solid fossil fuels, the standard is 1.2 lb/million Btu. Sulfur dioxide levels of 0.04, 0.12, and 0.03 ppm over prolonged periods of time have adverse effects on human health, materials, and vegetation, respectively. Federal expenditures to control SO2 total more than $60 million, an amount which is probably more than matched by private industrial money. To date, some 50 different flue gas sulfur oxides removal processes have been evaluated and tested; there are now about 10 scrubbing processes plus a handful of variants which the Environmental Protection Agency believes can be scaled up for commercial purposes. These processes are now being offered for sale by 14 engineering companies in the U. S. Of these processes, industry has commited itself to installing four different types at 21 plant sites: limestone scrubbing, sodium-based scrubbing, magnesium oxide scrubbing, and catalytic oxidation. Process developments and installations of the following types are described: dry injection, dry adsorption, wet absorption, carbon adsorption, and catalytic oxidation.

24054 APTIC NO. 44281

AGRICULTURAL USE OF SEWAGE SLUDGE. *(Landwirtschaftliche Klaerschlammverwertung). Text in German. Wasser Luft Betrieb, 16(7):241, July 1972.*

In the Federal Republic of Germany about 40 million cu m of sludge is collected per year in communal sewage purification plants and in biological industrial water purification plants. On the average this sludge contains 5% solid matter which cannot be incinerated because of air pollution and water pollution. Two new methods have been patented which eliminate the sludge without any new pollution of the environment. The so-called filtrotherm method heats the sludge for a brief period of time to between 60 and 100 C whereupon it is mixed with flocculants and filtered. The filter cake is dried and divided into two parts one is used as fertilizer the other goes to an incinerator whose waste heat is used for drying the filter cake and for preheating the sludge prior to filtration. The sludge water goes to the purification plant. The Humufloc method does not require as much equipment. The sludge is mixed with peat and flocculants and dehydrated by filtration. The filter cake is either composted, pasturized or dried by hot air to render it germ free. The two methods, whose operating costs are about equal, can be combined.

24055 APTIC NO. 44372

WASTE DISPOSAL WITHOUT ENVIRONMENTAL POLLUTION. *(Muellbeseitigung ohne Umweltverschmutzung) Text in German. Wasserwirtsch., 62(7): 230, July 1972.*

A shredder-compactor, eliminating the need for waste incinerators, particularly in high-rise apartment houses, is described. The RABCO Shredder/Compactor, manufactured by Benson Industries Ltd., North Vancouver, British Columbia, a fully automatic, economical, compact, and noiseless device, is suitable for processing domestic wastes, including small household utensils at a capacity of 500 kg/hr. No presorting is needed before shredding, and reduction in the waste volume lies at 80%. The shredder-compactor is equipped with automatic overload protection, and a deodorant can be automatically added to the waste being processed. The waste thus treated is suitable for disposal on dumps.

24056 APTIC NO. 44060

Acres, G. J. K. and B. J. Cooper

AUTOMOBILE EMISSION CONTROL SYSTEMS. PLATINUM CATALYSTS FOR EXHAUST PURIFICATION. *Platinum Metals Rev., 16(3):74-86, July 1972. 8 refs.*

Exhaust emissions account for approximately 65% of the pollutants from a car. U. S. Federal legislation governing automobile emissions includes stringent standards to be met in 1975 and 1976. Of particular importance are the requirements for a 90% reduction of carbon monoxide and hydrocarbon emissions from 1970 model year levels by 1975, and 90% reduction of nitrogen oxides emissions from 1971 model year levels by 1976. Control methods for exhaust emissions can be divided into two categories of prevention and destruction. Prevention has included leaner running engines by improved carburetion, distribution, and combustion to reduce CO and hydrocarbon levels. Incorporation of exhaust gas recycling (E. G. R.), where a small proportion of inert exhaust is by-passed to the inlet manifold to dilute the combustion mixture for nitrogen oxides control, forms the pattern of emission control system up to model year 1974. The severe emission limits for 1975 and 1976 has forced automobile companies to concentrate on post-combustion treatment of exhaust gases by destructive methods. Of the available destructive means, catalytic reactors are the most favored because of their high efficiency at low operating temperatures, and the relatively few modifications required for their installation. Catalyst systems remove CO and hydrocarbons by oxidation to carbon dioxide and water, and remove nitrogen oxides by reduction to nitrogen or by decomposition to nitrogen and oxygen. For 1975 it is sufficient to use an oxidation catalyst for control of CO and hydrocarbon emissions and the E. G. R. engine modification for control of nitrogen oxides. For 1976, a second catalyst bed is required to control nitrogen oxides. Air from a pump is fed into the exhaust gas stream after the reduction catalyst. This feeds an oxidation catalyst for control of CO and hydrocarbon emissions. Research has shown that the platinum group metals are the most active materials available for the required controls. Studies have shown that the cost of platinum would not be a significant proportion of the overall cost of the emission control system. Tests were run showing that the control system for 1975 produced CO, hydrocarbon, and nitrogen oxides levels below the 1975 standards after 26,500 miles travelled. The system proposed for 1976 models fell within the 1976 limits. Further tests are needed, particularly with regard to meeting the 50,000 mile durability requirement while still meeting the pollutant limits.

24057 APTIC NO. 43861

Adams, L. M., J. P. Capp, and D. W. Gillmore

COAL MINE SPOIL AND REFUSE BANK RECLAMATION WITH POWERPLANT FLY ASH. *Bureau of Mines, Washington, D. C. and IIT Research Inst., Chicago, Ill. Proc. Mineral Waste Utilization Symp., 3rd, Chicago, Ill., 1972, p. 105-111. 7 refs. (March 14-16.)*

Numerous coal mine refuse piles and strip spoil banks mar the countryside, contributing to stream and air pollution and land degradation. Experimental reclamation of several such sites with fly ash from bituminous coal-fired powerplants was conducted in West Virginia and Pennsylvania. Conventional farm equipment was used at some of the sites; large earthmovers were required at others. The fly ash served as a neutralizing agent, diluent, and soil amendment, providing some nutrients that encouraged vegetation of the barren areas while disposing of significant quantities of the powerplant waste. Estimated cost of reclamation by this method is $300 per acre of previously leveled area. This figure can vary considerably depending upon the topography of the site, distance from the source of fly ash, and quality of the fly ash. (Author abstract)

24058 APTIC NO. 44284

Amero, R. C.

FOR INDUSTRIAL BOILERS HIGH POUR LOW SULFUR OIL. *Nat. Eng., 76(7):12-17, July 1972.*

Low-sulfur industrial fuels often have higher pour point, lower viscosity, lower ash content, and cleaner burning characteristics than the equivalent grades of high-sulfur fuel. ASTM has recently revised fuel oil specification D-396 in a way that allows the viscosity of low sulfur No. 6 fuel oil to overlap the viscosity of No. 4 or 5 fuel oil. The volatile and burning properties of grades 1, 2, 4, 5, 6, and crude oils, both low and high-sulfur ones, are presented. A table for the sulfur content, viscosity, boiling range, gravity, water and sediment volume, carbon residue, and copper strip corrosion is given. An installation for burning fuel includes one or more storage tanks, one or more pumps, a fuel delivery line to the burner, a pressure-relief valve on the fuel line, and a return line for excess fuel to return to storage. Tank insulation saves heat and helps protect against wax deposition on the walls. Three heating methods can be used: steam or hot water tracing; electric tape or cable heating; and electric impedance heating. When switching to low-sulfur fuels, the operators of the systems have three options: pay a premium for fuel with pour point below 60 F; add heating to the potentially troublesome lines; and flush or drain the lines when not in use. The preheat applied to the fuel at the burner should be reduced, usually by 40 to 60 F or more to bring the fuel into the proper range for atomizing. The proper preheat can be established by checking the burner manufacturer's recommendations or by observing the flame as the preheat is lowered in 5 degree increments. The proper viscosity at the burner is very important for good atomization. In the combustion process, low-sulfur No. 6 fuel oil will be less likely to cause high temperature vanadium corrosion, slagging of the superheater, and cold-end corrosion of the air heater. This is a natural consequence of the lower vanadium, ash, and sulfur content of these fuels. The less viscous fuels may also burn faster, releasing a greater proportion of heat in the furnace and less in the superheater. This may require adjustments in operating conditions to maintain the design superheater temperature. With proper fuel heating and pumping equipment, low-sulfur industrial fuel oils are easier to handle and give a cleaner burning.

24059 APTIC NO. 43862

Amos, D. F. and J. D. Wright

THE EFFECT OF FLY ASH ON SOIL PHYSICAL CHARACTERISTICS. *Bureau of Mines, Washington, D. C. and IIT Research Inst., Chicago, Ill., Proc. Mineral Waste Utilization Symp., 3rd, Chicago, Ill., 1972, p. 95-104. 25 refs. (March 14-16.)*

One of the more promising methods of utilization of electrostatically precipitated fly ash from industrial stacks is the use of fly ash as a component of structural fills. Preliminary studies to determine the effect of mixing fly ash with natural soil material indicated these mixtures superior in certain engineering properties to either material used alone. Mixtures of sandy soil: silty fly ash (1:1) compacted much better than silty fly ash alone. Likewise, the addition of a very silty fly ash to two clay-like soils and one loamy soil reduced the plasticity and swelling characteristics of all the soil material. While shear strength of one series of clay-like soil: silty fly ash mixtures decreased as fly ash increased, this decrease did not become critical until a soil: fly ash ratio of 1:3 was reached. (Author abstract modified)

24060 APTIC NO. 44156

Amstislavskii, D. M., N. O. Panteleenko, and L. E. Matveeva

CORROSION PROTECTION OF SULFUR REMOVAL REGENERATORS. *(Zashchita ot korrozii regeneratorov tsekha seroochistki). Text in Russian. Koks i Khim., no. 3:53, 1972.*

The interior surface of the regenerator used for removal of hydrogen sulfide from coke oven gases was cleaned by sand blasting, then protected by a 4-coat system of primer, filler, and two top coats, all based on an epoxide resin. A finish, containing 70% epoxide resin and 30% coal tar, hardened with 8% polyethylenepolyamine (calculated on the weight of resin), and containing aluminum oxide as filler, was also used.

24061 APTIC NO. 43774

Andreasson, Stig and Carl-Elis Bostrom

DEALING WITH AIR POLLUTION. *Tek. Tidskr., 102(11):22-28, June 1972.*

The total emission of sulfur dioxide in Sweden was about 870,000 metric tons during 1970, of which 715,000 tons emanated from the burning of fuel oil and 155,000 tons from industrial processes. The SO2 concentration in a built up area can be reduced locally by centralizing the heating or by electric heating. By an Act of July 1969, fuel oil must not contain more sulfur than 2.5% by weight unless satisfactory flue gas control equipment is installed, and fuel oil burned within the greater Stockholm area and Goteborg must not contain more sulfur than 1% by weight. The Swedish company Bahco has developed a scrubbing process where the flue gases are treated with lime in two stages. The lime consumption is 0.43 tons/hr and the SO2 separation is about 97%. Dust particles are produced in the matallurgical process in the cupola furnace, sintering, and the Kaldo process. The dust separators used with cupola furnaces are single cyclone separators, multiple cyclone separators, bag house filters, electrical precipitators, or scrubbers. The most common type of scrubber used earlier was the spray chamber with an efficiency of 30 to 60%. For smaller furnaces mechanical separators and simple scrubbers are usually sufficient, whereas larger furnaces demand more effective separation equipment. The Kaldo process is an oxygen-blown method for steel manufacture employing a rotary furnace and delivering a 100 ton smelt after approximately 2 hours. All Kaldo furnaces in Sweden are equipped with electrical precipitators in order to reduce the emitted particulate matter. Control of odorous emissions from the pulp industry and of hydrogen sulfide, mercaptans, and hydrocarbons from the oil refinery industry are discussed. Regulations concerning motor vehicle exhausts are outlined. Investment costs are cited.

24062 APTIC NO. 44275

Arras, Karlheinz

NEW DEVELOPMENTS IN THE ELECTRICAL CLEANING PROCEDURES OF CALCINATING OVEN EMITTED GASES. *(Neue Entwicklungen bei der elektrischen Gasreinigung von Kalzinierofenabgas) Text in German. Preprint, Gesellschaft Deutscher Metallhuetten und Bergleute, Clausthal-Zellerfeld (West Germany), 7p., 1972. (Presented at the Gesellschaft Deutscher Metallhuetten und Bergleute-Hauptversammlung, Stuttgart, West Germany, April 26-30, 1972.)*

New developments in the field of electrostatic precipitators for aluminacalcining kiln waste gases are described. Vertical electrostatic precipitators are being increasingly replaced by less expensive horizontal designs. Such horizontal electrostatic precipitators have the advantages of improved gas distribution, dust removal by intermittent knocking, and the possibility of applying several independent precipitating areas. Pocket electrodes proved to be best. A horizontal electrostatic filter designed for a capacity of 100,000 cu m/hr at about 180 C waste gas temperature has an efficiency of 99.75%. Preliminary dust separators can be replaced by the cyclone of the heat exchanger before the rotary kiln. Kilns with a heat exchanger have the advantage of supplying waste gases at lowered temperature for the electrostatic precipitator. A combination of cyclone and horizontal electrostatic precipitator reduces the dust concentration from about 400 g/cu nm to 90 mg/cu nm at 110-120 C. The cyclone has an efficiency of about 97% and supplies fine dust in a concentration of 12 g/cu nm to the electrostatic filter, which has an efficiency higher than 99%. Simple preliminary dust collectors, so-called louver dust collectors, inserted in the electrostatic precipitator intake, represent the latest achievement in this field. Such louver dust collectors decrease the dust concentration from 250-300 g/cu nm to 100 g/cu nm at a pressure loss of about 25 mm water column.

24063 APTIC NO. 43814

Asaka, Urataro, Hiroyuki Nishimura, and Toshio Nomura

AUTOMOBILE POLLUTION CONTROL FUEL TANK. *(Jidoshayo taiki osen boshi nenryo tanku) Text in Japanese. (Honda Technical Research Inst. (Japan)) Japan. Pat. Sho 47-9361. 2p., April 10, 1972. (Appl. Dec. 13, 1968, 1 claim).*

This invention relates to a new fuel tank for preventing gas evaporation. The fuel tank is separated into several chambers with bent plates which are placed at different levels. Each plate has a hole at the center, which allows air to escape while fuel is being filled, and a few holes around the four edges. On the fuel outlet and air inlet tubes, both extended to the bottom of the tank, small holes are opened in each chamber. As the fuel decreases, it flows through the holes at the four edges to the next lower chamber, meanwhile, air is introduced into each chamber through the air inlet tube. Fuel evaporation is prevented by the quick supply of the evaporated fuels into the engine.

24064 APTIC NO. 43705

Asaoka, Eiji

SELECTION OF FANS FOR DUST COLLECTOR. *(Shujinyo sofuki no sentei) Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 39(6):539-548, June 1972. 6 refs.*

The Japan Mechanical Engineering Society has defined an air supplier as a fan when the pressure increase is below 1000 mm water, and as a blower when the pressure increase is more than 1000 mm water. The type of fan is largely determined by the rotation velocity (Ns) at which 1 cu m/m air is supplied at a 1 m head. The Ns values for various centrifugal fans ranges from 300 to 900 rpm. The ratios of suction diameter and impeller equivalent diameter are usually between 0.3 and 1.1. For a ratio much higher than unity, an axial-flow type centrifugal fan, which has a Ns value of 1000 to 2000, is used. The major factors for choosing an air supplier are mentioned and various types of fans are described.

24065 APTIC NO. 44101

Bachmann, H.

THE CONTRIBUTION OF PLASTICS TO THE PROTECTION OF THE ENVIRONMENT. *(Leistungen der Kunststoffe fuer den Umweltschutz) Text in German. Chem. Rundschau (Solothurn), 25(2):18, Jan. 1972.*

A lot of environmental pollution is blamed on plastics, since they pollute the groundwater and emit chlorine upon incineration. However, the plastics which are most commonly used for packing, polyethylene and polystyrol, burn to carbon dioxide and water vapor which are natural components of the air we breath. Only the incineration of polyvinyl chloride leads to the formation of hydrogen chloride. The use of this material is declining. Plastics are indispensable in the efforts of cleaning our environment. They are used for lining landfills to render them water-tight. They are used as material for the scrubbers necessary to clean the waste gases from the processing of aluminum. Each scrubber washes out about 300 kg fluorine and 600 kg sulfur dioxide. Plastics are used as material for the preheaters which warm the combustion air in automobiles in order to produce as little exhaust gas as possible.

24066 APTIC NO. 43897

Balluff, Robert N.

GASOLINE EVAPORATIVE EMISSION CONTROL. *(Tenneco Inc., Houston, Tex.) U. S. Pat. 3,658,042. 4p., April 25, 1972. 7 refs. (Appl. Feb. 10, 1969, 8 claims)*

A process is presented for preventing the saturation of fuel vapor storage systems used with internal combustion engines. This is accomplished by means of a small catalytic converter or reactor which is placed in the exhaust system close enough to the engine so that heat is available to rapidly raise the catalyst to an efficient operating temperature. The fuel vapors from the storage system are caused to flow through the catalyst reactor where they are converted or oxidized before passage through the engine or directly to the exhaust system. It had been previously proposed to control saturation of the storage means by purging the storage device into the intake manifold, but this could upset the engine air-fuel ratio which in turn might increase the total exhaust emissions of the engine above acceptable limits.

24067 APTIC NO. 44026

Bardi, G.

CONSIDERATION ABOUT THE FUTURE OF THE CUPOLA. *(Considerazioni sul futuro del cubilotto). Text in Italian. Fonderia Ital., 22(5):161-166, 1972. 7 refs.*

The future of the cold blast acid lined cupola, as the most widely used furnace for iron melting, is in jeopardy due to the steadily increasing price of coke and the high investment required to meet recently imposed air pollution standards. Cupola ovens emit metal oxides from raw materials and from vaporization in the fusion zone, silica and calcium oxide from refractory material, and combustible particulates from coke and other sources. Various ways of reducing pollution emission and coke consumption, while maintaining proper tapping temperature and high hourly output, include the use of high carbon coke and of calcium carbide to improve combustion efficiency, injection of methane or propane, injection of oxygen and of secondary air to intensify the blast, blast preheating by means of an autonomous generator, and heat recovery. All of these methods reduce the cost of fusion. Supplemental injection of gaseous fuels reduces coke consumption by 45% and that of blast by 25%. Cupolas exist, working exclusively with methane, which do not require the installation of any pollution control equipment. The median emission of particulates/ton of cast iron by a normal cold blast cupola is 11 kg which is reduced by using coke to 5.2 kg, by the use of 4% CaC2 to 4.2 kg, by methane or propane injection to 5.2 kg, by injection of 2% oxygen to 5.2 kg, by injection of secondary air to 5.3 kg, by preheating the blast to 300 C to 7.6 kg, and preheating to 500 C to 5.5 kg.

24068 APTIC NO. 43937

Barnard, Paul G., Aaron G. Starliper, Waldemar M. Dressel, and Morris M. Fine

RECYCLING OF STEELMAKING DUSTS. *Bureau of Mines, Washington, D. C. and IIT Research Inst., Chicago, Ill., Proc. Miner. Waste Util. Symp., 3rd, Chicago, Ill., 1972, p. 63-68. 15 refs. (March 14-16.)*

Methods are described for upgrading steel furnace dusts to produce high-iron pellets for recycling. These dusts contain impurities such as zinc, lead, and copper which reflect the character of the feed to the furnace and the operation of the furnaces. Treatment procedures investigated for the removal of these impurities and the recovery of an iron-bearing product include pelletizing and roasting in a reducing atmosphere to produce an iron material low in zinc and lead; sulfating dust with sulfuric acid and leaching to remove zinc and copper, followed by pelletizing and reduction to remove lead, thus yielding a high-iron pellet and allowing for copper and zinc recovery from the leach solution; gaseous sulfating with sulfur dioxide and water leaching to remove copper and zinc, followed by pelletization and reduction roasting to remove lead and residual zinc; and, roasting of pelletized mixtures of various types of steel furnace dusts such as high-zinc electric furnace dust with high-carbon blast furnace dust to produce an iron product low in lead, zinc, and carbon.

24069 APTIC NO. 43887

Billings, William G.

SOLVENT ABSORPTION OF CARBON MONOXIDE. *(Phillips Petroleum Co., Bartlesville, Okla.) U. S. Pat. 3,658,463. 4p., April 25, 1972. 8 refs. (Appl. Oct. 6, 1969, 11 claims).*

Various processes have been developed for the selective absorption of carbon monoxide from gaseous streams. One such process employs a cuprous chloride and magnesium chloride combination in aqueous solution. Another process used a cuprous complex salt in an organic solvent. These, and other processes, all contain certain limitations with respect to absorbent characteristics, absorption conditions, or absorbent regeneration capabilities which act to limit their application. The present process contemplates contacting the gaseous stream containing the CO with an organic liquid containing a cuprous salt, such as cuprous chloride, to selectively absorb CO from the gas stream. The absorbate is subsequently treated to separate the CO from it and to recover the absorbent which can be recycled to the contacting step.

24070 APTIC NO. 43972

Blake, Henry E. and W. A. Stickney

UTILIZATION OF BY-PRODUCT FLUOSILICIC ACID. *Bureau of Mines, Washington, D. C., and IIT Research Inst., Chicago, Ill., Proc. Miner. Waste Util Symp., 3rd, Chicago, Ill., 1972, p. 179-183. (Ma 14-16.)*

Two processes are described for utilizing the waste fluosilicic acid (H2SiF6) generated by the processing of phosphate-rock into fertilizers. The first process involves conversion of fluosilicic acid to a synthetic acid-grade fluorspar (CaF2) by first precipitating the silica with ammonia and filtering, and then reacting the ammonium fluoride (NH4F) filtrate with hydrated lime (Ca(OH)2). By this method over 95% of the fluoride is converted to calcium fluoride (CaF2). The second process involves neutralizing the H2SiF6 with Ca(OH)2 and silica and filtering and then volatilizing hydrofluoric acid (HF) from the dry precipitate by pyrohydrolysis at 1050 C. The HF-H2O vapors are condensed and the fluoride precipitated as sodium bifluoride (NaHF2) by addition of sodium fluoride (NaF) to saturation. Anhydrous HF is recovered from the dried NaHF2 by pyrolysis at 400 C. By this method, over 80% of the fluoride in H2SiF6 is recovered as anhydrous HF. (Author abstract)

24071 APTIC NO. 44222

Boesch

LIQUID GAS - A CONTRIBUTION TO ENVIRONMENTAL PROTECTION. *(Fluessiggas - ein Beitrag zum Umweltschutz). Text in German. Energie Tech., 24(6):205-206, June 1972.*

The significance and practical use of liquid gas are discussed. Natural or liquid gas produces practically no carbon monoxide and sulfur dioxide emissions. Liquid gas samples analyzed contained a total of 1-5 mg of sulfur/kg. Some 8% of the total gas consumption in West Germany is secured by liquid gas. Since the use of liquid gas is limited by certain factors, it should be used primarily for domestic heating, in small-scale industry, recreational areas, and sport facilities. Liquid gas-powered Otto engines, emitting one hundredth of the CO discharged by comparable gasoline engines, should be used in vehicles for communal services and public transportation, fork lift trucks, and other equipment.

24072 APTIC NO. 44201

Boettner, E. F. and T. H. Miller

THE INFLUENCE OF ADDITIVES ON THE HYDROGEN CHLORIDE EMISSION BY BURNING OR CHARRING PVC. *(Der Einfluss von Zusaetzen auf die Chlorwasserstoff-Abspaltung von brennendem oder verkohlendem PVC). Text in German. Gummi, Asbest, Kunstst., 25(6):570-575, June 1972. 11 refs.*

Tests were conducted to determine the effect of additives on hydrochloric acid emissions from burning polyvinyl chloride. The acid gases formed during incineration at 400-600 C were determined by titration. No direct relationship between flameproof finishing and the reduction of HC emissions was found. Antimony trioxide, zinc stearate, and barium borate were the best flameproofing agents, while the effect of calcium carbonate on acid emissions depended largely on the granulometry. Increased amounts of additives were of negligible influence on acid emissions. Tin was the best stabilizing agent and phosphorus esters were the best plasticizers. Fillers with flameproofing and HCl-absorbing properties caused a maximum 30% reduction in the acid emissions relative to PVC, while increased additives reduced the emissions by up to 60%. When reduced flammability or self-quenching properties are required, small amounts of known flameproofing agents are able to reduce the HCl emission by about 10%. In addition to HCl, ethylene and other olefins, antimony halogenides, benzene, bromic acid, acetylene, and compounds containing carboxylic groups are formed from burning PVC.

24073 APTIC NO. 44151

Bonn, W. and U. Bosshard

CEMENT WORKS EXPERIENCE AND CONSIDERATIONS RELATING TO THE DESIGN OF BYPASS SYSTEMS. *(Betriebserfahrungen und Gedanken zur Projektierung von Beipassanlagen). Text in German. Zement-Kalk-Gips (Wiesbaden), 25(6):281-282, June 1972.*

In a preheater kiln with an output of 2500 tons/24 hr alkali chloride concentrations gave rise to trouble in operating the plant. This trouble was obviated by installing a bypass system. Measurements in the region of the kiln inlet showed the most favorable location for installing the bypass to be in the upper part of the calcining chamber. A temporary bypass was installed there. It was so designed that the hot gas was quenched to 400 C by fresh air and that water could be sprayed in. During these experiments a new kiln for 3000 tons/day was planned, to operate with raw meal containing up to 0.15% chlorine. Two bypass designs were investigated: cooling the hot gas with cold air to 400 C; and cooling effected almost exclusively with water. As the latter solution was considered to be too risky and awkward to achieve from the construction point of view, an arrangement was adopted comprising an enlarged mixing chamber which would permit the injection of water at a later stage, should that be decided. The mixed gas, cooled to 400 C, is moistened in a cooling tower and relieved of its dust in a separate electrostatic precipitator. (Author summary modified)

24074 APTIC NO. 44193

Brasoveanu, I., V. Iovita, and C. Iovita

CARBON MONOXIDE CONVERSION CATALYST ACTIVITY AS AFFECTED BY ITS AVERAGE CRYSTALLITE SIZE. *(Influenta dimensiunii medii a cristalitelor asupra activitatii catalizatorului pentru conversia oxidului de carbon). Text in Rumanian. Rev. Chim. (Bucharest), 23(5):263-264, May 1972. 3 refs.*

To point out the correlation between catalytic activity and particle size of the high temperature carbon monoxide conversion catalyst, an iron oxide-chromium trioxide system was prepared from iron sulfate and chromic anhydride. A narrow size range from 185 to 205 angstrom of the catalytic crystallites provided optimum CO conversion conditions in a gas mixture containing 20% CO, 8.0% carbon dioxide, 70% hydrogen, 0.5% methane, and 1.5% nitrogen. The average size of the crystallites was determined utilizing the correlation between particle size and diffraction peak occurring on the crystal powder roentgenogram (Scherrer s equation). The determination error was + or 14%.

24075 APTIC NO. 43724

Briggs, Paul

FIGHTING POLLUTION AND RESISTING CORROSION. *Pollut. Eng., 4(2):48, March-April 1972.*

Production of activated carbon to remove unwanted colors and odors in pollution control can also create its own serious contamination products. Emission from boilers ranges from 650-800 F and contains flyash and flue gases, including various amounts of oxygen, carbon dioxide, nitrogen, sulfur dioxide, and sulfur trioxide. A new emission control system has been designed and completed to meet current and estimated future government ambient air standards. Boiler gases first enter a saturator where water spray reduces the temperature to 180 F. Saturated gas then is fed to a venturi-type scrubber and separator made of rubber-lined steel. From the separator, the treated gases pass to an induced draft fan which keeps the system under negative pressure, and then to a stack. The process exhaust gases, containing water vapor, sulfur oxides, and other trace corrosives, produce a condensate inside the stack with a strongly acid pH. For maximum corrosion resistance, a bisphenol- A fumarate type of polyester was used for the equipment. Water is used in two ways in the plant: in the air purification system and in the production of activated carbon. As a result wastewater contains lignite, carbon, flyash, and acid wastes. Acid waste receives initial neutralization in a collection sump, and is then piped to the neutralization tank. The neutral water, which still contains very fine particles, goes next to the clarifier. The resulting sludge is pumped to the filter building where water is removed. After neutralization and solids are removed, treated water is recycled through the plant or discharged.

24076 APTIC NO. 44220

Buergel, Heinz and Karl-Heinz Legner

PLASTICS FOR HARD COAL PROCESSING PLANTS. *(Kunststoffe fuer Steinkohlenaufbereitungsanlagen). Text in German. Glueckauf (Essen), 108(14):557-562, July 1972. 1 ref. (Presented at the Arbeitsgemeinschaft Deutscher Aufbereitungs-Ingenieure Conference, Bochum, West Germany, Jan. 26, 1972.)*

The use of plastics for hard-coal processing plants is described. Suction pipes made of steel corrode in 2-5 years and have buildups of coal dust on their insides due to condensation, these disadvantages cannot be satisfactorily eliminated by expensive enamel coatings. Pipes and suction hoods can be made of a new plastic Vestolen AX 859. This plastic, a light weight polyethylene, is electrically conductive (surface resistance 10,000-1,000,000 Ohms), resistant to wear, and has low flammability. Explosions in such pipes due to coal dust caused no fire. Burning tests revealed no increase in the rate of combustion, and flames were extinguished by an air flow of 8 m/sec.

24077 APTIC NO. 44113

Buttermore, William H., William F. Lawrence, and Richard B. Muter

CHARACTERIZATION, BENEFICIATION AND UTILIZATION OF MUNICIPAL INCINERATOR FLYASH. *Bureau of Mines, Washington, D. C., and IIT Research Inst., Chicago, Ill., Proc. Miner. Waste Util. Symp., 3rd, Chicago, Ill., 1972, p. 397-410. (March 14-16.)*

Characterization studies of municipal incinerator fly ashes showed that these materials were composed primarily of compounds of silicon, aluminum, calcium, iron, sodium, and potassium. Significant variations in the carbon and sulfur contents of the individual ashes were noted and attributed to differences in the operation and combustion efficiencies of individual incinerators. The fly ashes were fine materials with a considerable portion (up to 39%) passing through a 200 mesh screen. Visual analysis, both macroscopic and microscopic, revealed that the fly ashes, although flaky or granular in appearance, were composed of discrete particles of glass, metal flakes, paper ash and unburned paper fragments. Beneficiation studies of the residue material, including separation by size and specific gravity, showed that although occasional upgrading of valuable constituents was obtained, simple beneficiation techniques appear to offer little or no significant economic potential. Accordingly, the development of products which could provide a total utilization of the residue material was examined. The production of lightweight aggregate for concrete appears to be the most promising area for fly-ash utilization in that all of the ashes tested were made into aggregate suitable for use in structural concrete. Concrete made using municipal incinerator fly ash-based aggregate was not only 30 lbs lighter/cu ft, but stronger in compressive breaking strength than concrete made using crushed limestone and sand aggregate. Also, high-strength fired bricks were made using municipal incinerator flyash in quantities comprising greater than 75% of the mix. In one test, using 96.6% fly ash, brick exceeding ASTM specifications for moderate weathering face brick was produced. The brick has a pleasing, light brown textured surface and will accept a clear or colored surface glaze. In addition, feasibility studies of aerated concrete production using municipal incinerator flyash indicated that while a lightweight product could be obtained, further research is necessary to provide an adequate compressive strength. The production of castable ceramics was found to be economically unfeasible due to the excessively high heat energy required to melt the raw material.

24078 **APTIC NO. 43755**

Calvert, Seymour, Dale Lundgren, and Dilip S. Mehta

VENTURI SCRUBBER PERFORMANCE. *J. Air Pollution Control Assoc., 22(7):529-532, July 1972. 6 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 63rd, St. Louis, Mo., 1970, Paper 70-8.)*

Particle collection efficiency in venturi scrubbers was studied to account for the effects of particle size and wettability, venturi size, and fluid flow rates. Experimental determinations were made for 1 in. and 2 in. diameter venturis, and for a 4 in. by 12 in. rectangular cross-sectioned venturi of 5000 CFM capacity. The test aerosols were spray-dried uranine, uranine mixed with boric acid, and methylene blue. Particle diameters ranged from 0.5 to 4.6 micron. Calvert's equation for particle collection efficiency in atomizing scrubbers was refined to include a continuous integration with point values of collection efficiency. Data on experimentally determined collection efficiency and a computed correlative parameter, f, are presented in tables and plots. The results show that the design equation is more rigorous after modification. Particle wettability is very important and collection efficiency is higher for hydrophilic than hydrophobic particles. At low water to air ratios there is an increase in the effectiveness of water. Data from the literature are used along with the present results to yield recommended values of f for design purposes. It was not possible to obtain reliable data from the 1 in. diameter venturi after many experiments. (Author abstract modified)

24079 **APTIC NO. 43794**

Charmbury, H. B. and D. R. Maneval

THE UTILIZATION OF INCINERATED ANTHRACITE MINE REFUSE AS ANTI-SKID HIGHWAY MATERIAL. *Bureau of Mines, Washington, D. C. and IIT Research Inst., Chicago, Ill., Proc. Mines Waste Util. Symp., 3rd, Chicago, Ill., 1972, p. 123-128. (March 14-16.)*

One phase of a project on the utilization and beautification of anthracite refuse material is described. In the past, the material has been piled haphazardly and some piles have ignited, creating air pollution. Approximately 30 of the burning piles in the anthracite area of Pennsylvania have been extinguished in the past nine years. The extinguished material is called incinerated anthracite refuse. The incinerated refuse was properly prepared by crushing and sizing, tested as anti-skid highway material on all types of roads, and found to perform statisfactorily. Size analyses of the crushed and screened incinerated anthracite mine refuse are presented. (Author abstract modified)

24080 **APTIC NO. 44203**

Chopey, Nicholas P.

COAL GASIFICATION: CAN IT STAGE A COMEBACK? Chem. Eng., 79(8):44-46, April 3, 1972. 11 refs.

Coal gasification is suddenly arousing considerable interest because it promises to ease long-range U. S. fuel supply problems without worsening the environment. There is, however, a stumbling block. The economy has become geared to natural gas's high heating value, which is around 900-1000 Btu/cu ft; straightforward coal gasification as commercially practiced up to now produces a gas with only about 400-500 Btu/cu ft. Almost all new gasification proposals expect to boost gasified coal to the heating value of natural gas by submitting the gasifier output stream to shift conversion and purification, and then converting the stream's carbon monoxide and hydrogen content into methane. This methanation step is very exothermic, and considerable design ingenuity will be needed to control methanation temperatures so as not to harm the catalyst. Federal funding of coal gasification projects is mentioned, and pilot plant and other gasification ventures are discussed.

24081 **APTIC NO. 44354**

Courchaine, C., J. Erickson, and J. Cleland

TASTE AND ODOR PRODUCING SUBSTANCES ESCALATE WATER TREATMENT COSTS. *Public Works, 103(8):62-65, Aug. 1972.*

After many complaints were lodged concerning taste and odor problems in the drinking water of three Michigan cities, investigations were undertaken to determine more satisfactory treatment methods. Two of the cities, Gladstone and Menominee, due to process advantages and also to a somewhat less severe problem in the raw water, found that a modest activated carbon application of between 5 and 8 mg/l was successful in producing a palatable water, although complaints, particularly with reference to heated water, continued to be numerous. At Escanaba, varying levels of breakpoint chlorination seemed only to intensify tastes and odors in the finished water. Nor was chlorine dioxide, a compound with approximately twice the available oxidizing strength of chlorine gas, by itself capable of completely oxidizing the tastes and odors. Prechlorinated water, treated with various carbon dosages, did not produce a taste and odor free water in the laboratory bench tests; however, several tests on untreated water indicated that high concentrations of activated carbon, 40-50 mg/l, would remove the tastes and odors in 10 to 20 minutes. Modifications were made in the treatment plant to allow simulation of laboratory methods. Due to minimal short circuiting and ample detention time in the clear well, prechlorination was eliminated. Chlorine dioxide was applied directly ahead of the filters and free chlorine residues were closely monitored on filtered water samples. The carbon feed point was relocated to allow introduction of activated carbon slurry to the raw water at the shore well. This provided an additional 10 minutes of adsorption time before alum was applied to coagulate and settle out the carbon before filtration. The problem of premature carbon settling was reduced with a submersible pump in the shore well. Process costs and future design considerations are discussed.

24082 **APTIC NO. 43938**

Covey, James N. and John H. Faber

ASH UTILIZATION - VIEWS ON THE GROWTH INDUSTRY. *Bureau of Mines, Washington, D. C., and IIT Research Inst., Chicago, Ill., Proc. Miner. Waste Util. Symp., 3rd, Chicago, Ill., 1972, p. 27-34. (March 14-16.)*

Within the past 20 years there has been a steadily increasing effort on the part of coal-burning electric utilities to use byproduct power plant ash in their own construction projects and to promote and market the material for use by other sectors of the construction field. Application methods for coal fly ash, bottom ash, and boiler slag are discussed with emphasis on resource conservation. In highway and airport runway work, lime-fly ash aggregates and ash-lime-sulfate sludge compounds are being tested, with coal bottom ash and slag receiving increased attention as road aggregates. Coal ash is contributing to highway safety as shown in a recent study in West Virginia where it was used as a skid-retardent aggregate. Fly ash has been utilized as a lightweight aggregate or concrete and as a construction material used in buildings as bricks and gas or aerated concrete. Efforts for ash utilization in the areas of sanitary landfills, agriculture and land reclamation, and coal mine fire control are being explored with applications as an intermediate cover in landfills, for reclaiming coal mine strip spoil, and in the filling of mines. Future trends are examined, giving note to on-going research which will provide answers for future utilization.

24083 APTIC NO. 44048

Cross, Frank L.

PLANNING INCINERATION WITHOUT AIR POLLUTION. *Pollut. Eng., 4(4):48-49, July 1972.*

On-site incineration, for industrial plants, stores, and other commercial buildings is attractive because of the expense of hauling long distances to a municipal incinerators, the high cost of scavenger services, and more rapid disposal vector control purposes. Many current air pollution regulations specify that multiple chamber units be installed to meet the particulate emission standard of 0.2 grain/cu ft or less. The only air pollution control device which has proved to be economical and effective on small package-type incinerator units up to 1000 lb/hr capacity is the wet collector. Spray chambers and venturi scrubbers are indicated. Pre-planning is essential for designing an incinerator installation, and some criteria which should be included in such a plan are listed.

24084 APTIC NO. 44135

Crossland, Stuart

PROCESS LIQUIDS TO SNG. *Hydrocarbon Process., 51(4):89-93, April 1972. 16 refs.*

The headlong rush to develop supplemental supplies of gas, particularly substitute natural gas (SNG) from liquids, creates a need for basic knowledge of the processes. During gasification, several reactions take place simultaneously in an adiabatic manner, heat being neither removed nor added. Initially, hydrocarbon cracking reactions predominate. When the amount of decomposition is low, carbon-containing products are formed in the presence of a relatively high partial pressure of steam, and the equilibria favor the production of carbon dioxide and hydrogen no matter what the initial products are. As decomposition progresses, the steam partial pressure decreases by consumption in the reaction and by dilution with the increased volume of product gas. The highly exothermic methanation reaction then takes over and the temperature rises to a level higher than the inlet temperature. The water-gas shift and methanation reactions are fast and achieve equilibrium, thereby dictating the gas composition leaving the catalyst bed. The reaction mechanism and kinetics are discussed, including catalysts, catalyst life and activity, migration, hydrocracking, hydrogen, and hydrogasification. It is suggested that hydrocarbon is adsorbed by the catalyst according to a Langmuir mechanism and, if it is a normal paraffin, it reacts rapidly on the surface to produce entities containing one or two carbon atoms. These fragments then react with adsorbed steam and for n-hydrocarbons. The steam is strongly adsorbed on sites which are different from those responsible for hydrocarbon adsorption, and reaction takes place following migration of one or both of the reactants to adjacent positions. The methanation reaction and economics of the SNG processes are considered.

24085 APTIC NO. 43953

Daellenbach, C. B. and W. M. Mahan

COPPER-ZINC REMOVAL FROM SCRAP IRON OXIDE BY PELLETIZATION- CHLORIDIZATION. *Bureau of Mines, Washington, D. C. and IIT Research Inst., Chicago, Ill., Proc. Mineral Waste Utilization Symp., 3rd, Chicago, Ill., 1972, p. 113-120. (March 14-16.)*

Removal of copper, zinc, and lead from contaminated oxide scale products was accomplished using a combined pelletization chloridization process. Copper and zinc, the major metal contaminants of the oxide, along with lead, were selectively removed through high-temperature chloride compound formation and subsequent volatilization. In addition to lowering contaminant levels, the fine sized oxide was converted into high grade pellets suitable for use either as blast furnace feed or for further processing into prereduced pellets. The process begins with pelletizing the comminuted oxide after mulling with a binder and chloride additives. Metal contaminants form chlorine compounds, which are volatilized during a 90 min, 1250 C pellet induration cycle. Pellet copper, zinc, and lead levels, which were initially 0.43, 1.44, and 0.10%, were reduced to 0.08, 0.13, and 0.001%, respectively, with a 6% calcium chloride addition. Fired-pellet crushing strengths were excellent (800-1000 lbs) for nominal 0.5-in pellets. (Author abstract modified)

24086 APTIC NO. 44334

Darrah, B. R., and V. Frega

REMOVING AIR POLLUTANTS WITH PACKED SCRUBBERS. *Plant Eng., 26(15): 66-68, July 27, 1972.*

Types of scrubbers, scrubber efficiency requirements, scrubber characteristics, and criteria for selecting the proper type of scrubber design, including tower-packing and construction materials to ensure best performance and cost savings, are discussed. Depending on the depth of the packed bed, the liquid flow rate, and the composition of the scrubbing liquid, efficiencies up to 99.9% can be obtained in the removal of gaseous contaminants. Fiber reinforced plastics (FRP) are being used more extensively to replace stainless steel, rubber, and PVC-lined steel and other alloys for scrubber bodies. FRP is a material composed of polyester or epoxy thermosetting resins and glass fiber reinforcements to give a finished laminate that has excellent corrosion resistance and a high strength-to-weight ratio. Almost any type of scrubber can be built of FRP. Required depth of packing depends on the following factors: type of scrubber packing; concentration of and solubility of the polluting gas; gas and liquid flow rates; type of scrubbing liquid, and liquid and air stream temperatures. Assuming normal particle distribution, the quantity of particles removed on a weight basis in the first 12 in. of packing is often on the order of 97 to 99%, since weight is a function of the cube of the particle diameter. Because most of the solids are deposited in this zone, high liquid rates in the range of 4 g/m/sq ft to 20 g/m/sq ft are used to give high washing rates for removal of solids. The capability to increase the packing depth and the effect of gas pressure drops on the scrubber operating costs are features of packed scrubber design worthy of emphasis. In the aluminum industry, where huge amounts of air are exhausted from the potlines, a 0.5-in. water gauge static pressure reduction can save as much as $50,000 annually in energy costs. The plant engineer should be acquainted with the alternative choices to select the proper equipment.

24087 APTIC NO. 44007

Davis, John C.

DESULFURIZATION PART 2. SO2 REMOVAL STILL PROTOTYPE. *Chem. Eng., 79(13):52, 54-56, June 12, 1972.*

New approaches and bigger projects for sulfur dioxide removal from stack gases are discussed. In the regenerative alkaline process, an alkaline agent strips SO2 from the flue-gas stream, combining chemically with SO2. In a separate regeneration step, the agent is reconstituted and sulfur is recovered, usually as liquid SO2 or sulfuric acid. Some of the agents used include magnesium oxide, sodium sulfite, metal carbonates, and manganese dioxide. The nonregenerative alkaline category is made up of so-called throwaway processes. An agent combines chemically with SO2 in the flue-gas stream, but it is cheap enough to throw away the product on a once- through basis. Commonly used agents are limestone, lime, dolomite, and solid carbide wastes from acetylene manufacturing. Furnace injection, a throwaway process, differs from the last in that the agent is injected directly into the furnace, and the sulfated product is scrubbed out of the flue gas with water. Part of the SO2 is captured chemically within the furnace, the rest in the scrubbing step. Catalysis uses a catalyst to promote oxidation of SO2 to SO3. This method recovers H2SO4, but high inlet-gas temperatures are required. Regenerative solid adsorption comprises several activated-charcoal processes in which SO2 is adsorbed on charcoal. In most routes, subsequent desorption leads to the production of H2SO4. Regenerative organic absorption differs from alkaline absorption in that an organic absorbing medium is used. The developers and manufacturers of these processes are also given.

24088 APTIC NO. 43974

Dean, K. C. and C. J. Chindgren

ADVANCES IN TECHNOLOGY FOR RECYCLING OBSOLETE CARS. *Bureau of Mines, Washington, D. C. and IIT Research Inst., Chicago, Ill., Proc. Miner. Waste Util. Symp., 3rd, Chicago, Ill., 1972, p. 213- 221. 1 ref. (March 14-16.)*

Shredding, smokeless incineration, and hand dismantling methods for recycling automotive scrap are rapidly making inroads into the accumulations of obsolete cars across the country. Bureau of Mines developments in the smokeless incineration of scrapped automobiles and in the design and operation of equipment for the recovery of nonferrous metals from shredded automotive nonmagnetic rejects by air and water classification methods are summarized. Results of experimental work on the recovery of copper and iron values in generators and starters by hand dismantling and leaching methods and on separation of copper wire from insulation by cryogenic techniques are also reported. (Author abstract modified)

24089 APTIC NO. 44230

Dietzel, F.

GAS TURBINES AT THE HANNOVER FAIR. *(Gasturbinen auf der Hannover- Messe). Text in German. Energie (Munich), 24(6):155-160, June 1972.*

Gas turbines exhibited at the Hannover Fair are described. Combined gas and steam turbines with economizers, utilizing gas turbine waste gases to a lower temperature limit of 170 C, have an efficiency of about 36%. One combined unit has an efficiency of 39% at 180 C waste gas temperature. The hot waste gases (400 C) from the gas turbine, having air excess coefficients of 4-6, are sent to the steam generator of the steam turbine. Fuels such as natural gas or cheap liquid fuels, causing no high-temperature corrosion, are suitable in continuous operation, while light fuel oil is relatively expensive. One gas turbine combined with a waste heat recovery system reached nearly 80% efficiency regarding electric and thermal energy. Open-cycle gas turbines for peak loads use mostly diesel fuel, natural gas, throat gas, or heavy fuel oil.

24090 APTIC NO. 44637

DiGiacomo, Joseph D.

NEW APPROACHES TO THE DESIGN OF AFTERBURNERS FOR VARNISH COOLERS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 30p., 1972. 15 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 65th, Miami, Fla., June 18-22, Paper 72-103.)*

It is apparent that the best method of controlling varnish kettle emissions is by thermal incineration. Earlier thermal incineration systems utilized conventional combustion equipment such as the refractory nozzle-external blower and the refractory nozzle-100% premix. The new approaches utilize either of two completely different combustion systems. One, the integral-blower burner, offers substantial decreases in installation, operating, and maintenance costs. Installation costs are reduced by eliminating expensive combustion air piping, by making burner mounting, easier, and by giving simple adjustments for initial start-up. Operating costs are reduced by taking advantage of the heat energy available in the fume stream and the burner turn-down ratio of 40:1. Maintenance costs are reduced because the cast iron burner nozzle needs no repair or replacement. The second new approach utilizes a non-powered raw gas burner. Combustion air is obtained from the fume stream, eliminating the need for a combustion air blower. Installation costs are reduced by elimination of the combustion air blower, the in-line mounting of the burner, and the simple gas train piping. Maintenance costs are reduced because the burner has no moving parts. Operating costs are decreased by utilizing the heat energy available in the effluent. Further fuel savings occur by the increase of approximately 25% in the net heat available from the fuel. The new approaches achieve an increase of almost 100% in mixing velocity. This increase in turbulence reduces maximum fuel consumption by approximately 20%. Residence time is reduced by 29% by means of the non-powered raw gas burner approach. The length/diameter ratio is significantly reduced, and an average of 65% is achieved. Either approach offers significant advantages over conventional methods.

24091 APTIC NO. 44278

DuMond, T. C.

BURNING WASTES TEST METTLE OF MATERIALS. *Iron Age, 210(6):52-54, Aug. 10, 1972.*

As chlorides and other gases and solids are drawn through scrubbers, solids are removed. Some of the gases combine with water to form acids. Of these, the most damaging is hydrochloric acid. The acid attacks the scrubbers, ductwork, and induced draft fans, which draw gases through the scrubbers and exhaust them to the atmosphere. Most scrubbers and fans, in the past, were made of uncoated carbon or low alloy steel. In some cases this type of equipment was corroded in a matter of weeks. If cooling waters are recirculated in scrubbers without intermediate treatment, the acid content rises rapidly and promotes attack faster than might ordinarily be the case. For mildly corrosive locations, some of the better corrosion resistant paints can be satisfactory. For more severe conditions, there is the possibility of protecting metal with polyvinyl chloride coatings. For many years the most widely used coating material has been rubber. The most recent addition to the list of coatings are Teflon and other fluorocarbon plastics. In addition to being closely adherent and abrasion resistant, these coatings, are immune to most common corrodents. Fiberglass reinforced plastic is growing in importance as an engineering material in fan and scrubber fabrication. Grouped with titanium as materials with optimum properties and high cost) are such metals as Hastelloy alloy C-276 and Inconel 625. Classified as good and suitable for all but the most severe applications are alloys such as Inconel 825, Carpenter 20 and Hastelloy alloy G. The New York City 73rd Street incinerator, considered a model set-up, handles saturated exhaust gases at about 140 F. Fan housings are rubber-lined mild steel. The fan, fabricated of Inconel 800, shows no sign of attack after more than two years of service.

24092 APTIC NO. 43802

Edouard, L.

ELECTRIC ENERGY FROM THERMAL SOURCES AND THE ENVIRONMENT. (Energie electrique d origine thermique et environnement). Text in French. Tech. Moderne, 64(5):20-26, May 1972.

General problems of thermal power plant-generated air pollution and possible means of controlling such emissions are described. Dust, sulfur dioxide, carbon monoxide, and nitrogen oxides are the basic pollutants from thermal power plants. While CO emissions with values below 0.01% are negligible, the specific soot discharge is about 1 g/kg of fuel. The sulfur content in coal is between 0.5 and 1%, in heavy oil between 2 and 3%, in normal fuel oil in a range of 0.4-0.7%, and at 0.0002% in purified natural gas. Decreasing the amount of pollutants discharged, neutralization, and improved dispersion conditions are the basic means of controlling air pollution from power plants. Electrostatic dust separators at a 250 MW-power plant have an efficiency of 98-99%. The gas flow rate is 1-15 m/sec. Sulfur dioxide emissions from oil-firing power plants can be abated by desulfurization of the fuel or the flue gases or the temporary use of low-sulfur fuel. The SO2 can be neutralized by injections of ammonia at a rate of 1-2 kg/ton of oil and of dolomite, used in an amount of about 0.5 kg/ton. The dispersion, a function of stack height, gas output and flow rate, the vertical temperature gradient as well as of local turbulence, can be improved by installing high stacks and by providing high gas flow rates of 12-20 m/sec. The maximum stack heights required for 250 and 600 MW-power plants are 160 and 240 m, respectively. Permanent dust sedimentation and SO2 concentration measurements around power plants were carried out. The dust emission from coal- firing facilities decreased from 9 g/kWh in 1959 to 0.8 g/kWh in 1970 by increasing the dust separation efficiency from 85.5 to 98.4%, and by shutting obsolete plants down. The daily average SO2 concentration in 1970 was 0.060 mg/cu m. While there are no techniques for waste gas desulfurization available, processes applying ammonia injections and ozone for SO2 oxidation are being studied.

24093 APTIC NO. 44091

Emi, H. and K. Okuyama

RECENT STUDIES ON THE FILTRATION OF SUB-SUBMICRON AEROSOLS. *(Cho bisho ryushi roka no kenkyu genjo.) Text in Japanese. Kuki Seijo (Clean Air - J. Japan Air Cleaning Assoc., Tokyo), 10(2):49-54, June 1972. 26 refs.*

Recent studies on the filtration of sub-submicron aerosols are reviewed. The theoretical collection efficiency of a fiber packed filter is discussed in terms of five dimensionless parameters: a diffusion parameter, Reynold number, a correction parameter, Knudsen number, and a screening parameter. High collection efficiency was usually obtained with a small-diameter fiber and thorough diffusion of the aerosols. The collection efficiency for experimental aerosols 1 micron in diameter showed scattering, whereas that for aerosols 0.001-0.1 micron was satisfactory. The experimental error was largely influenced by the presence of small amounts of larger particles in sub-submicron aerosols. It is necessary to consider the gaseous behavior of sub-submicron aerosol when the Knudsen number is large.

24094 APTIC NO. 44299

Emi, Hitoshi, Kiyoshi Nakata, Kikuo Okuyama, Masaji Nomura, and Yutaka Yamagishi

COLLECTION EFFICIENCY OF AEROSOL BY SINGLE RIBBON MODEL FILTER. *(Tansen sukurin ni yoru earozoru no hoshu koritsu). Text in Japanese. Preprint, Japan Society of Chemical Engineering, Tokyo, p. 210-212, 1972. 4 refs. (Presented at the Japan Society of Chemical Engineering, Annual Meeting, 37th, Nagoya, Japan, 1972.)*

A single wire screen filter model, which is made of wires placed in one direction only, was used to measure dust collection; it was compared with the theoretical collection rate in order to clarify the mechanism of screen filters with lattice mesh. The inertia interruption efficiency of a single ribbon filter was calculated and the locus of particles were obtained. Dust particles were most effectively captured by ribbons when aerosol was sent at a high speed and when the theoretical curve reached the highest point. The theoretical and actual measurements showed a good agreement.

24095 APTIC NO. 44315

Emi, Hitoshi

DUST COLLECTION EFFICIENCY OF FIBER LAYER FILTERS. *(Senso firuta no shujin koritsu). Text in Japanese. Kagaku Kogaku (Chem. Eng.), 36(6):587-593, June 1972. 14 refs.*

Fiber layer filters made of fiber mat with 95% gap rate were studied. The theoretical estimation for dust collection efficiency of fiber layer filters was studied. The arrangement of the fibers and the area where the dust is collected are shown. The mechanism of dust collection is illustrated with figures. The collection efficiency was obtained by mathematical equations. Mathematical formulas are derived and demonstrated for the calculations of single cylinder collection efficiency. The results can be applied to fiber filters if there is no interference between fibers. The validity of the theoretical model was studied experimentally. The relation between inertia interference and collection efficiency was studied and the theoretical curves and experimental data were compared. The effect of particle size was studied and a mathematical equation was obtained. The collection efficiency with the dust load was studied. A chart of filter systems is presented. The filters are divided in to plane filters and deep filters.

24096 APTIC NO. 44328

Emi, Hitoshi and Naoya Yoshioka

RECAPITULATION OF AEROSOL FILTERING MECHANISM BY FIBER PACKED LAYER. *(Sen i jutenso ni yoru earozoru roka kiko no matome). Text in Japanese. Preprint, Japan Society of Chemical Engineering, Tokyo, p. 201-203, 1972. 2 refs. (Presented at the Japan Society of Chemical Engineering, Annual Meeting, 37th, Nagoya, Japan, 1972.)*

The collection rate of single fiber screen filters was calculated theoretically, and considerations for inertia, dispersion, gravity, and interruption were added. The transition process of aerosol collection rate from the gravity dominant area to the dispersion dominant area was examined, and the mechanism of certain conditions which create the dominant factor was examined. Dispersion and gravity effects become dominant when linear velocity is low. However, when particle sizes are large, gravity dominates and when particle sizes are small, dispersion dominates the aerosol collection rate. The effects of various parameters of particle diameters and linear velocity on the mechanism of aerosol collection efficiency are presented by graphs and explained by formulas.

24097 APTIC NO. 43999

Endo, Yoshiharu, Nobuhiko Tanaka, and Takao Yonekura

CATALYST COMPONENTS FOR OXIDATION OF EXHAUST GAS. *(Hai gasu sankayo shokubai soseibutsu) Text in Japanese. (Nisshin Chemical Industries Co., Ltd (Japan) and Shinetsu Chemical Industries Co., Ltd (Japan)) Japan. Pat. Sho 47-7763. 4p., March 6, 1972 (Appl. Dec. 15, 1967, 2 claims).*

This invention relates to the components of a catalyst for the oxidation of carbon monoxide, hydrocarbons, and the partially oxidized hydrocarbons in automotive exhaust gas. The catalyst consists of cupric oxide, stannic oxide, and clay, or cupric oxide, stannic oxide, chromium oxide, and clay. The ratios of the components are, 0.1 to 30 g-atom of tin compared to 1 g-atom of copper, or 0.1 to 10 g-atom of chromium compared to 10 g-atom of copper and tin, and 10 portions of clay in weight to 1 portion of the oxides. The mixture is first mixed with water and dried at 110 C for two hours as particles of about 4 mm in diameter and then baked at 700 C for two hours. Experimental results show that the conversions of CO are as high as 94 to 96% at the initial reaction temperature of from 120 C to 180 C. It is also shown that the new catalyst has a lower reactivity declination than the platinum catalyst.

24098 APTIC NO. 44457

Force, Edwin L. and Richard J. Ayen

CATALYTIC REDUCTION TO 50 - 5000 PARTS-PER-MILLION NITRIC OXIDE BY CARBON MONOXIDE. *Preprint, California Univ., Berkeley, Dept. of Chemical Engineering and Stauffer Chemical Co., Richmond Calif., 65 p., 1972 (?). 34 refs.*

The excess of carbon monoxide over nitric oxide in automobile exhaust suggests that an oxidation-reduction reaction between these two species should be examined as a means of removing them in a catalytic converter. A study was conducted to obtain kinetic rate data for the copper chromite-catalyzed reduction of NO by CO at NO concentrations of 50 to 5000 ppm and at reaction temperatures of 240 to 500 C, which are characteristic of automobile exhaust. Other objectives were to select and build a reactor system for obtaining the desired rate data and to find an appropriate rate equation for correlation of the kinetic data. The recycle reactor was selected over the equivalent well-stirred continuous reactor on the basis of literature indications of more extensive development and use. A schematic diagram of the experimental apparatus is included. The NO and CO reactant gases were metered by measuring the pressure drops over individual, calibrated .008-inch capillary tubes. A diagram of the gas chromatographic system used to determine NO, CO, and nitrogen concentrations in the reactor product is included. Preliminary experiments were conducted on the catalytic activity of the apparatus and the catalyst reduction and break-in. A rate equation is proposed that is believed to be satisfactory from an empirical point of view. Two orders of magnitude of reactant concentrations and rates are correlated over a 260 C temperature range with an average relative deviation on the order of the uncertainty in the experimental measurements. Although these results satisfy one of the objectives of this work, some attempt must be made to verify the reaction model.

24099 APTIC NO. 44638

Francis, Fred J.

SECONDARY ALUMINUM SMELTER AIR POLLUTION CONTROL USING A CHROMATOGRAPHIC COATED BAGHOUSE -- A TECHNICALLY NEW AND ECONOMIC SOLUTION. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 25p., 1972. (Presented at the Air Pollution Control Association, Annual Meeting, 65th, Miami, Fla., June 18-22, 1972, Paper 72-79.)*

The sources of air pollution for secondary aluminum smelters and chromatographic coated baghouses to control that pollution are described. The secondary aluminum smelting industry consumes aluminum scrap generated by wastage from new factory production or from obsolescence and scrapping of old products. This industry represents approximately 25% of total production of aluminum in the United States. The raw material is scrap, and it comes with pollutants such as oil, paint, and plastics, and because of its volume it has to be melted under a flux cover containing salt, potash, cryolite, or fluorspar, which gives off fumes containing chlorides and fluorides. In addition, most of the scrap intake into a smelter consists of wrought alloys containing magnesium (e.g., beer cans). The pollutants in aluminum industry are: carbonaceous particles both combustible and noncombustible, oil particulates, magnesium and aluminum chlorides, chlorine, hydrogen chloride, and hydrogen fluoride. Control methods attempted throughout the world, namely scrubbers, afterburners, and baghouses are reviewed briefly. The reasons for choosing the novel chromatographic coated baghouses are explained. Results of tests from a total of four runs completed utilizing chromatographic coated baghouses are discussed. Samples taken for dust analysis reveal that in all four runs, the amount of emitted dust was down to the minimum (an average of 0.0005 grain). The results of runs show it is possible to reduce particulate emission and noxious emissions to virtually zero by means of chromatographic coated baghouses. An analysis is made of operating costs, which are 1/3 to 1/2 of other potential systems, such as scrubbers and afterburners. (Author abstract modified)

24100 APTIC NO. 43882

Franz, William F. and Howard V. Hess

HYDRODESULFURIZATION OF HEAVY HYDROCARBON OIL WITH HYDROGEN PRESATURATION. *(Texaco Inc., New York, N. Y.) U. S. Pat. 3,657,112. 3p., April 18, 1972. 4 refs. (Appl. June 22, 1970, 6 claims).*

A process is described for the catalytic hydrogenation of heavy hydrocarbon oils containing at least 1% Conradson Carbon Residue. The oil is passed in intimate contact with hydrogen through a presaturation zone at a temperature below 700 F. The liquid oil, containing dissolved hydrogen, is then contacted with a hydrogenation catalyst in the presence of free hydrogen under hydrogenating conditions at a temperature above 700 F. Such a process suppresses undesired side reactions which lead to the deposition of coke and the concomitant deactivation of the catalyst.

24101 APTIC NO. 43935

Friedman, Sam, Henry H. Ginsberg, Irving Wender, and Paul M. Yavorsky

CONTINUOUS PROCESSING OF URBAN REFUSE TO OIL USING CARBON MONOXIDE. *Bureau of Mines, Washington, D. C. and IIT Research Inst., Chicago, Ill., Proc. Miner. Waste Util. Symp., 3rd, Chicago, Ill., 1972, p. 439-445. 5 refs. (March 14-16.)*

Exploratory engineering studies for the development of a continuous process for converting organic refuse to oil were conducted with a nominally 1 lb/hr bench-scale unit. Refuse was reacted with carbon monoxide and water, with the water also serving as a slurry vehicle for solids feeding. Sodium carbonate was added as a catalyst. Because it is chemically typical of urban waste, sucrose in aqueous solution was used in preliminary process variable studies to expedite the definition of optimum conditions. The preferred operating temperature and pressure were 315 C and 4000 psig, respectively, while a residence time of about 1 hr was sufficient. Highest oil yields obtained so far from the continuous unit are 34% by weight of sucrose and 26% by weight of dry ash-free urban refuse, which translates to 1-2 barrels of oil/ton of refuse. The theoretical limit of oil yield is about 50%; the remainder is carbon dioxide, water, and ash. (Author abstract modified)

24102 APTIC NO. 44194

Fujimoto, Kaoru, Kaneyasu Iuchi, and Tatseki Kunugi

OXIDATION OF CARBON MONOXIDE WITH PALLADIUM CHLORIDE-ACTIVE CHARCOAL CATALYST. *(Enka parajiumu-kassei tan shokubai ni yoru issanka tanso no sanka hanno) Text in Japanese. Nippon Kagaku Kaishi (J. Chem. Soc. Japan), no. 4:706-711, April 1972. 7 refs.*

Carbon monoxide was oxidized with a palladium chloride-active charcoal catalyst in the presence of water. Carbon monoxide was catalytically oxidized to carbon dioxide even in the absence of redox reagent such as cupric chloride. The catalyst system was assumed to be composed of the oxidation of carbon monoxide by palladium (II) chloride and palladium was further oxidized by oxygen gas with the catalytic action of active charcoal. Its reactivity was about 10 times that of ethylene. The reaction rate was well simulated by a derived equation. It resulted in the conclusions that among several complexes present in the reaction system, the active result is (PdCl2(CO)(H2))n or the like, and that the rate determining step is the hydrolysis of the complex to form carbon dioxide and reduced palladium. The effects of the partial pressure of carbon monoxide and steam are understood according to the mechanism mentioned above. The reoxidation of palladium by oxygen is very fast, and consequently, it is not rate determining despite the fact that the oxidation rate of carbon monoxide is very high.

24103 APTIC NO. 43868

Fukuda, Tokumatsu

INTERNAL COMBUSTION ENGINE EXHAUST GAS TREATMENT DEVICE. *(Nainen kikan no haiki gasu joka sochi). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 47-10570. 2p., April 19, 1972. (Appl. July 25, 1967, 1 claim).*

This invention relates to a new filtering device for internal combustion engine exhaust gases. On one side of the cylindrical tank, a gas inlet tube, which directly connects the muffler and the filtering device, is extended into the tank. Filters, composed of two metal nets on both sides and a flame retarded fiber sheet in the middle are equipped in the tank at equal distances. The mesh of the metal net is larger on the side of the gas entrance and gradually decreases toward the side of the gas exit, whereas the density of the fiber sheet, on which the flame retarded fibers are randomly arranged, is smaller on the entrance side and gradually increases toward the exit side. By this arrangement, impurities with different sizes are easily captured on filters of different fiber densities and net mesh. An air inlet is equipped at the bottom of the tank on the gas entrance side, and the filtration is assisted by introducing air from this inlet.

24104 APTIC NO. 44001

Fukumoto, Tsutomu

ON THE INCINERATION OF PLASTIC WASTES BY A CONTINUOUS-FEED INCINERATOR WITH PAN SHAPED HEARTH AND SCRAPERS AND ON THE TREATMENT OF WASTE GAS AND LIQUID DISCHARGED FROM THE INCINERATOR PLANT. *(Purasuchikku haikibutsu no shokyaku, haigasu, haisui shori oyobi baien boshi). Text in Japanese. Nenryo Kyokaishi (J. Fuel Soc. Japan, Tokyo), 51(540):222-232, April 1972. 6 refs.*

Experiments on the incineration of plastic wastes by a continuous- feed incinerator with pan-shaped hearth and scraper and having a capacity of 250 kg/hr were conducted. The results of the removal of hydrochloric acid, sulfur dioxide, soot, and heavy metals in the waste gas are reported. The incinerator consists of three combustion chambers; in the secondary and tertiary combustion chambers, temperatures are kept at 900 to 1200 C for complete combustion of unburned materials from the primary chamber. The flue gas is cooled to 100 C or lower by air and a cold water spray, by which part of the harmful gas and soot are removed. Hydrochloric acid is removed by froth beds on four sieve trays at an efficiency of up to 99.84% when the height of the froth layer is 80 mm. Eighty percent of the SO2 is removed by absorption with a sodium hydroxide solution at a weir height of 80 mm. An efficiency of 90 to 98% is obtained for the collection of soot in the waste gas.

24105 APTIC NO. 44043

Gallo, Phillip A.

SYNTHANE--A CANDIDATE FOR SUCCESS. *Gas World, 175(4575):334-335, April 22, 1972.*

The uniqueness of the Synthane gasification process lies not in the processing steps, but rather in the manner in which pretreatment and gasification are integrated and the novel heat removal technique employed in the methanation step. Process coal is reduced in particle size to less than 20 mesh and dried in a pulverizer with preheated air. The crushed coal is then fed through a pretreater to the gasifier. The function of the pretreater is to remove the tendency of certain coals to become sticky when heated. In the pretreater, coal reacts with steam and oxygen at a temperature of 750 F. The gasifier is a fluidized bed operating at a temperature of about 1800 F and a pressure of 1000 psi. Coal enters the gasifier at the top, then passes through a free fall section before becoming mixed with the other reactants in the fluidized bed. During the free fall, the coal particles are carbonized and the volatile constituents are partially converted to methane. Once in the fluidized bed, coal reacts with oxygen and steam. Upon leaving the gasifier, the synthesis gas passes through a cyclone and then is washed with water to remove particulate matter and tars. The gas then passes through an oil scrubber, and the cleaned gas enters a shift converter where some of the carbon monoxide plus water is converted to carbon dioxide and hydrogen. The synthesis gas is purified by removing the carbon dioxide and hydrogen sulfide with hot potassium carbonate solution. The potassium carbonate solution containing the acid gases is regenerated and returned to the absorber; the Claus process is used to convert to elemental sulfur the hydrogen sulfide in the off-gas from the regenerator. Traces of sulfur are removed from the synthesis gas by iron oxide towers and activated carbon. The purified synthesis gas then passes to the methanation section.

24106 APTIC NO. 44039

Gilbert, L. F.

REDUCE BOILER OPERATING COSTS WITH METERING CONTROLS. *Power, 116(6):78-79, June 1972. 1 ref.*

Recent increases in operating costs--fuel costs in particular--coupled with a decrease in the premium paid for metering controls, appear to make these systems economically attractive for watertube boilers of virtually any size. Another advantage of the metering combustion control system is that it enables one to operate with lower excess air than is possible with parallel controls, decreasing nitrogen oxides emissions. Further, it permits closer control of steam generation and is capable of handling load changes with less likelihood of particulate emissions. The metering control system is less susceptible than parallel controls to changes in ambient conditions, fuel characteristics, or equipment performance. A reliable oxygen analyzer, an electronic system, and logic functions are indicated for metering control systems. Maintenance considerations are mentioned.

24107 APTIC NO. 44021

Gouwens, Paul R. and Eugene Aleshin

UTILIZATION OF FOUNDRY WASTES. *Bureau of Mines, Washington, D. C., and IIT Research Inst. Chicago, Ill., Proc. Miner. Waste Util. Symp., 3rd, Chicago, Ill., 1972, p. 69-73. 6 refs. (March 14-16.)*

Past research has demonstrated that utilization of foundry effluents is both technically and economically feasible. Experimental data indicate that arc furnace dust for noncorrosive primer paint is the most promising use for any foundry effluent. In addition, arc furnace dust might be used as tint and tinting hues in furniture stain and ink. Secondary applications for arc furnace dusts are road fill and ballast and for road safety applications. Furthermore, cupola effluent should provide satisfactory soil conditioning due to its granular nature. Due to its gel-like nature when wet, sand reclaimer waste (AID), may be useful in stabilizing soils to prevent collapse during excavation. In addition, AID injected into the soil, in combination with Portland cement or silicates, may assist in leak prevention in foundations.

24108 APTIC NO. 44038

Grace, Robert J., Richard A. Glenn, and Raymond L. Zahradnik

GASIFICATION OF LIGNITE BY BCR TWO-STAGE SUPER-PRESSURE PROCESS. *Ind. Eng. Chem. Process Design Develop., 11(1):95-102, 1972. 10 refs. (Presented at the American Institute of Chemical Engineers, Denver, Colo., Aug. 30-Sept. 2, 1970.)*

Optimization results are reported for the second stage of the Bituminous Coal Research two-stage super-pressure gasifier by operation of a 100 lb/hr process and equipment development unit with lignite at 1000 psi and exit temperatures from 1400-1600 F. Hot synthesis gas is generated internally by reacting benzene or cyclohexane, oxygen, and steam in a simulated first stage which entrains and gasifies a pulverized coal feed as it passes downward through an 8-inch diameter, 5-foot long second stage. Second stage conditions closely approximate those expected in full scale gasifier operation. Direct yields of methane range from 11-18% of the carbon in the lignite feed, depending upon the partial pressure of hydrogen in the Stage 1 gas. Overall carbon conversions are 35-55%. The unconverted carbon is completely gasified in Stage 1 to generate both the heat and synthesis gas required for Stage 2. (Author abstract)

24109 APTIC NO. 44168

Gudzyuk, V. L., V. I. Bakhirev, V. A. Ageyev, and B. M. Nikitchenko

COMBUSTION OF PETROLEUM SLUDGE IN A BUBBLING-TYPE APPARATUS. *(Szhiganiye nefteshlama v ustroystve barbotazhnoga tipw). Text in Russian. Neftepererab. Neftekhim., no. 2:6-9, 1972.*

The combustion of petroleum sludge in a bubbling-type apparatus produced a gaseous effluent containing 10-12% carbon dioxide, 0.09- 0.13% sulfur dioxide, and 3.1-5.5 g/cu m of particulates in industrial tests with 3-3.6 tons/hr of feed containing 40-60% water and up to 5% particulates. Raising the capacity to 7-8 tons/hr would require equipment modification to ensure complete combustion. Adding 10% of activated sludge containing 40% water and 18.5% particulates did not affect the combustion. Investment and operating costs are lower than for a fluidized-bed installation. The bubbler unit has seven feed inlets at the base perimeter. A primary air supply is bubbled up to atomize the sludge, which is then burned with the aid of a secondary air supply from 48 inlets at two levels. The water content of the feed is reduced from 85% in a settling tank before combustion.

24110 APTIC NO. 43752

Harima, Mikio

AMMONIA ABSORPTION, PHOSAM PROCESS. *(NH3 kyushu, PHOSAM purosesu). Text in Japanese. Aromatikkusu (Aromatics), 24(1):26-31, 1972.*

A new process for ammonia gas removal is described. Ammonium phosphate solution is used as the absorbing agent in the so-called Phosam process. The absorbent is sprayed from the top of the absorbing tower in a counterflow direction to the incoming coke oven gas (COG) which has just emerged from a primary cooler, exhauster, and a gas purifying tower in which solid content moisture, and tar of the COG are removed. More than 98% of the NH3 is removed in the absorbing tower. The resulting solution is then led to a separator to which hot steam is supplied and ammonia water is separated from the phosphate solution which is recycled to the absorbing tower. Anhydrous ammonia gas is generated at high pressure by introducing steam into the ammonia fractionation tower. The pressure loss of the absorbing tower is designed at 100 to 150 mm Aq, and the process can be designed for any desired gas feed, NH3 recovery, and product purity.

24111 APTIC NO. 43760

Harima, Mikio

DISPOSAL OF EFFLUENT GAS FROM SULFUR RECOVERY UNIT. *(Iwo kaishu sochi karano haigasu shori). Text in Japanese. Kemikaru Enjiniyaringu (Chem. Eng.), 17(5):510-520, May 1972. 10 refs.*

The latest desulfurization processes applied to the disposal of effluent gas discharged from sulfur recovery units are reported. The effluent gas is treated directly as it is or as a combustion gas after incineration. The types of process developed for the treatment of the effluent gas from sulfur recovery units introduced include: the Wellman-Lord Process, developed by Wellman-Lord and licensed to Mitsubishi Kakoki and Sumitomo Engineering in Japan; the IFP Method, developed by IFP of France; the BEAVON Process, developed jointly by R. M. Parsons Co. and Union Oil Co.; the Soda Scrubbing Process; the Shell Process, developed by Shell Co.; and the Throughbred Process, perfected by Chiyoda Kako Kensetsu Co. As for the analyzers used to detect the composition of the tail gas, gas chromatographic and optical analyzers were introduced with block diagrams describing their basic mechanisms. The SNPA tail gas control system, an automated control system designed to ensure continuous optimum operation of the sulfur recovery unit, installed in the Lacq natural gas refinery in France, is discussed.

24112 APTIC NO. 44096

Harneit, Berthold

ROOM HEATING AND THE ENVIRONMENT. *(Raumheizung und Umwelt). Text in German. Preprint, 16p., 1972. (Presented at the INTHERM Conference, Stuttgart, West Germany, March 23, 1972.)*

Light fuel oil-fired heating systems are presently the best choice. Light fuel oil has a price which is acceptable for the consumer; such heating systems are also adjustable to the seasonal demands for domestic heat. Light fuel oil, however, contains sulfur and thus contributes to sulfur dioxide emissions. But through the increasing number of oil-fired heating systems in homes, SO2 emissions are on a downward trend in the large cities of Germany. In Hamburg the SO2 concentration in the air was 0.33 mg/cu m 10 years ago. Now it is down to 0.1 mg/cu m. The tolerance limit for SO2 has been set to 0.4 mg/cu m. The cities Frankfurt and Munich had a slight but steady reduction of the SO2 concentration. The switch from coal to light fuel oil mostly accounts for this. West German refineries invested $100 million in fuel-oil desulfurization plants. As a consequence, the sulfur content of light fuel oil was reduced from 0.8 to 0.4% by weight. A further step for reducing the emissions from oil-fired heating systems would be the proper maintenance of the furnaces. In North Rhine Westphalia, an annual inspection of such furnaces is mandatory.

24113 APTIC NO. 43934

Hatfield, J. D. and J. M. Potts

USE OF WEAK ACIDS TO IMPROVE SULFUR OXIDE ABSORPTION BY LIMESTONE SLURRIES. *Preprint, American Inst. of Chemical Engineers, New York, 20p., 1972. 4 refs. (Presented at the American Institute of Chemical Engineers, National Meeting, 72nd, St. Louis, Mo., May 21-24, 1972.)*

A survey of weak organic acids showed that many of them are capable of dissolving calcium carbonate and magnesium carbonate and therefore are of potential value in improving the scrubbing of sulfur dioxide by limestone slurries. The physicochemical properties of four selected acids--benzoic, glycolic, phthalic, and adipic--and their calcium and magnesium salts were determined with respect to stability, solubility, effect on the oxidation rate of sulfite to sulfate, and the nature of aqueous species. Small scale tests were made to demonstrate the effectiveness of some of the organic acids in improving absorption of SO2. The proportion of benzoic acid required to effect an improvement was determined in closed loop spray tower operation under conditions designed to remove about 50% of the SO2 without additive. The addition of 10% of the stoichiometric amount of benzoic acid to solubilize the feed limestone increased the SO2 removal by about 10 percentage points; 50% of the stoichiometric acid gave a 22 percentage point increase, but further improvement with added acid was small. The use of benzoic acid resulted in a higher degree of oxidation of the product solids in the scrubbing operations, although laboratory tests with oxygen indicated that oxidation of dissolved sulfite is inhibited by the acid. The high oxidation in the scrubber tests presumably resulted from the lower pH brought about by the benzoic acid addition and the consequent larger amount of dissolved sulfite available for oxidation. (Author abstract modified)

24114 APTIC NO. 43790

Haucke, Manfred, Werner Theobald, and Alfred Wutschel

WATER PROTECTION AND REFUSE REMOVAL IN THE STEEL INDUSTRY. *(Gewaesserschutz und Abfallbeseitigung in der Stahlindustrie). Text in German. Stahl Eisen (Duesseldorf), 92(12):565-575, June 1972.*

The refuse substances from the steel industry can be classified into products which can be re-used, circulation products, and non-utilizable substances. In 1970, about 13 million tons of blast furnace slag were used as road construction material or prepared as blast furnace cement. In small quantities it is used as an additive in concrete production. A large quantity of metallurgical slags and residues containing iron is reused in the steel industry. Fine-grained steel slag and dust as well as mill scale is used in sintering plants for the optimization of the degree of humidity. The electrical gas purification, which is necessary in the steel industry for the prevention of air pollution by means of dust, should consist of a mechanical separator providing for the recycling of a large part of the collected dusts. In a second dedusting step, the harmful substances could be concentrated and the developing fine dust or sludge could be reused. At present, the refuse quantity in the steel industry which cannot be used amounts to 100 kg/ton of raw steel, which is only 10% of the total refuse quantity.

24115 APTIC NO. 44394

Heaney, J. P. and L. Doughty

OPTIMAL ATMOSPHERIC EMISSION CONTROL IN THE WOOD PULP INDUSTRY. *Atmos. Environ., 6(2):93-102, Feb. 1972. 10 refs.*

A mathematical programming model was formulated to determine the optimal atmospheric emission control alternatives for the pulp industry. Generalized multi-path diagrams were developed showing the emission sources, the unit emissions from these sources, and the available control alternatives. Using these diagrams it is possible to depict a given mill by selecting the appropriate flow paths. The formulation of the optimization model as a mixed integer-linear programming problem is presented. Then the results of a sample analysis using the model are described. A procedure is presented for determining the net cost of particulate emission standards as well as a sensitivity analysis of the impact on the optimal solution of varying the value of recovered chemicals. (Author abstract)

24116 APTIC NO. 43973

Herbert, William

SOLID WASTE RECYCLING AT FRANKLIN, OHIO. *Bureau of Mines, Washington, D. C., and IIT Research Inst., Chicago, Ill., Proc. Miner. Waste Util. Symp., 3rd, Chicago, Ill., 1972, p. 305-310. 2 refs. (March 14-16.)*

A 150 ton/day design capacity solid-waste processing and recycling plant has been operating in Franklin, Ohio since June, 1971. The plant was constructed under a demonstration grant from the Bureau of Solid Waste Management to determine the technical and economic feasibility of a newly developed wet processing system. The solid waste is converted into a water slurry, and then separated into various components by centrifugation and selective screening. Additional separations are effected by magnetic separation, air classification, and optical sorting. Nonrecoverable organics are burned in an inert bed fluid bed reactor. The feed for the reactor has an average calorific value of 7500 Btu/lb of dry matter, and autogenous combustion is achieved at 1500 F with 35% solids content. Approximately 37% of the material processed by the plant is burned in the fluid bed reactor. By employing a waste heat boiler, about 1600 to 1700 pounds of steam can be recovered from the exhaust gases/ton of waste fed into the system.

24117 APTIC NO. 44205

Hino, Yoshinori

TREATMENT OF BY-PRODUCTS FROM FLUE GAS DESULFURIZATION PROCESS AND ITS MARKETABILITY. *(Haien datsuryu fukusanbutsu no shori to shijosei). Text in Japanese. Netsu Kanri (Heat Management: Energy and Pollution Control), 24(8):21-28, Aug. 1972. 6 refs.*

A general discussion is given on the treatment of the by-products from flue gas desulfurization such as sulfuric acid, ammonium sulfate, sodium sulfite, sulfur, and gypsum. It is estimated that the comsumption of H2SO4 will be approximately 7,300,000 tons in 1975, and the production will be 8,400,000 tons, without including that produced as a by-product from flue gas desulfurization. New applications of sulfur to road construction have been developed. However, since the production is still much more than the amount required, the cost has been largely declining. The consumption and production of sodium sulfite are expected to be balanced in 1975. The by-product from the lime-base desulfurization process is a mixture of calcium sulfite hydrate, calcium sulfate hydrate, and calcium carbonate. It is used for the reclamation of the foreshore or for gypsum production.

24118 APTIC NO. 43740

Hishida, Kazuo

AIR POLLUTION CONTROL TECHNIQUES FOR HYDROCARBON EMISSION. *(Tanka suiso kei busshitsu no hoshutsu seigyo taisaku). Text in Japanese. Sekiyu Gakkai Shi (J. Japan Petroleum Institute, Tokyo 15(7):550-557, July 1972. 6 refs.*

The hydrocarbon/nitrogen oxides ratio is known to have much to do with the photochemical reactions leading to photochemical smog. It is said that oxidant is most likely to form when the hydrocarbon/ nitrogen oxides ratio is 10/1. The fact is that the formation of oxidant is drastically reduced when the ratio is 3/1 or less. In view of the fact that a reduction of nitrogen oxides emissions cannot be achieved at present, the most effective measure to prevent photochemical smog is to reduce hydrocarbon emissions. Of the causes for photochemical smog, those that can be artificially controlled are the emissions from automobiles, mobile sources, and stationary sources such as gasoline stations. Measures to control nitrogen oxides and hydrocarbon emissions to change the emission ratio, and to use less active hydrocarbons can be taken for the mobile sources; measures to prevent hydrocarbon evaporation can be taken for the stationary sources. The measures set forth by the Tokyo Metropolitan Government include: carbon monoxide emission in the idling mode should be 5% or less; specified types of automobiles are required to be equipped with catalytic afterburners and a blow-by gas reduction device; a reduction in automobile traffic; hydrocarbons in gasoline should be analyzed and the results made public and used as the basis to provide oil refineries and gasoline dealers with necessary guidance and recommendations; and gasoline stations or factories are require to install devices to prevent hydrocarbon evaporation. Various methods to prevent hydrocarbon evaporation are introduced, including an adsorption method, condensation-adsorption combination and activated carbon.

24119 APTIC NO. 44367

Ichijo, Michio

ZINC, COPPER, AND CADMIUM REFINERIES. *(Aen, do, kadomiumu seirenjo). Text in Japanese. Kinzoku Zairyo (Metals in Engineering), 12(5):20-26, May 1972. 14 refs.*

A general discussion is given of the present status of pollution control in various metal refineries. In 1969, only 30.7% of the total sulfur dioxide from zinc, copper, and cadmium refineries in the U. S. was recovered, the other 69.3% being released to the atmosphere. A control policy has since been formulated. Sulfur dioxide in flue gas is usually recovered as sodium sulfite, ammonium sulfate, sulfuric acid, gypsum, or high concentrated SO2. There is a wide range of dust-generating sources. The problem is being gradually solved through use of cyclones, bag filters, electrostatic precipitators, scrubbers, and other control equipment. The treatment of waste water and sludges, and the removal of mercury and arsenic, are also described. Processes for the removal of mercury from flue gas and the wet treatment of pyrites are illustrated in flow charts.

24120 APTIC NO. 44287

Iinoya, K.

OUTLINE OF DUST COLLECTORS. *(Shujin sochi gairon). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 10(3):1-10, Aug. 1972.*

A general discussion is given on the characteristics of various dust collectors. The cyclone is usually only suitable for particles of 3 to 10 microns in size, whereas the electrostatic precipitator, venturi00 scrubber, and bag filter can be used for particles as small as 0.1 micron. The disadvantage of the bag filter is the deterioration of the filter after a certain period of operation. The electrostatic precipitator has a much lower pressure loss and the venturi scubber has the highest, whereas both the cyclone and bag filter have a water medium pressure loss at about 100 to 300 mm water. Among all types of dust collectors, the cyclone has the lowest efficiency for dust collection. However, an improved cyclone with a 97.5% efficiency is available. Typical examples of each type of dust collector are described.

24121 APTIC NO. 43796

Ikari, Yoshikatsu

POLLUTION CONTROL PROBLEM IN PULP AND PAPER INDUSTRY - ITS POLICY AND TECHNOLOGY. *(Kami parupu kogyo to kogai mondai - Seisaku kara gijutsu e -). Text in Japanese. Seni to Kogyo (Textile and Industry), 5(3):140-152, March 1972. 9 refs.*

A review of the pulp and paper industry and its problems is presented. Pulp and paper industry of Japan has recorded an unusually high growth rate in the 1956-1970 period. Japan now ranks the world's third in pulp production, only next to the U. S. and Canada, and second in the paper board production only next to the U. S. Taking 1960 as 100, the production indexes for 1970 are 249.1 and 287.5, respectively. This rapid growth has resulted in two major problems, import of the raw material and rapidly aggravated pollutions, especially water pollution. Wheter the industry decides to continue the thorough production policy, under which the manufacturing of all the pulp and paper products begin with the processing of raw materials, or change this policy to captive import, in which the industry will depend on the import of pulp and paper products manufactured by the overseas plants operating on Japanese capital, the pollution problem remains yet to be solved. According to a MITI survey, the industry's capital investment for the installation of pollution control plants and equipment in 1970-1973 is estimated at $195,751,300, of which 79.86% is for the control of water pollution, 12.09% for flue gas purification, 4.38% for disposal of wastes, 1.85% for noise control, and 1.12% for the control of offensive odors. Of the total investment in 1970-1972, that for pollution control is estimated to account for 33.3% in pulp manufacturing, 9.7% in paper manufacturing, and 11.3% in paper board manufacturing. Air pollution sources in the industry include ordinary boilers, KP boilers, and lime kilns.

24122 APTIC NO. 43867

Imai, Hisashi

ENGINE EXHAUST GAS ABATEMENT AND SPARK FIRE CONTROL DEVICE. *(Enjin haikien gensho oyobi kahun boshi sochi). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 47-10571. 3p., April 19, 1972. (Appl. Aug. 3, 1967, 1 claim).*

This device relates to a new apparatus attached next to the main muffler for the purpose of engine exhaust gas abatement and spark fire control. The cylindrical device is divided into three chambers. Gases from the main muffler are introduced to the upper chamber from which they pass through a separating board into the middle chamber. The gas is led by the inclined wings of the separating board to guiding panels, on which the sparks in the gas strike at a considerable velocity and vanish. The resulting gas, containing particulates, circulates in the middle chamber due to the effects of the guiding panels, and the particulates drop to the dust collecting chambers in the inner walls through irreversible holes. Clean gas is released through the third chamber.

24123 APTIC NO. 44289

Ishiguro, Tatsukichi

TOKYO-TO, EAST SUMIDA FISHMEAL COOPERATIVE TREATMENT PLANT. *(Tokyo-to higashi Sumida gyochokotsu kyodo shori kojo). Text in Japanese. Akushu no Kenkyu (Odor Research J. Japan), 2(6):17-26, June 1972.*

The devices used in a cooperative plant for the treatment of fishmeal are described. The appartus for pre-treatment consists of pre-breaker, magnetic separator, metal detector, and mincer. Material from the pre-treatment process are fed into a cooker and, after being cooked, are treated with a second mincer, a sludger, a three layer separator, and then concentrated. The removal of odors is based on a previously described procedure. A flame photometric detector is used for the gas chromatographic analysis of the odor sample. Results from tests show that the odor concentration is decreased form 20,000 to 196 in the washing tower.

24124 APTIC NO. 44014

Ishihara, Yoshimi

NITROGEN OXIDE EMISSIONS FROM STATIONARY SOURCES. *(Kotei nensho sochi kara no chisso sankabutsu). Text in Japanese. enryo Kyokaishi (J. Fuel Soc. Japan, Tokyo), 51(537):3-10, 1972. 13 refs.*

When fossil fuels are burned with air, some of the oxygen and nitrogen present combine to form oxides. Their concentration depends upon variables such as flame temperature, oxygen concentration, and nitrogen content in fuels. Because of the absence of available techniques for removing nitrogen oxides from flue gases, efforts are focused to the combustion modification techniques for eliminating the nitrogen oxide emissions. The present status of their development, such as two stage combustion, flue gas recirculation, and off-stoichiomettic combustion are described. Some problems for the determination of nitrogen oxides on flue gases are also described. (Author abstract modified)

24125 *APTIC NO. 43967*

Ishizuka, Saburo and Katsuro Okamura

BAG FILTERS. (Bagu firuta). Text in Japanese. Kuki Seijo (Clean Air - J. Japan Air Cleaning Assoc., Tokyo), 10(1):20-29, April 1972.

Bag filter materials, waste gas bag filters in iron industries, and pocket style bag filters are discussed. In Europe, dacron, woolfelt, and cotton are used mostly as bag filter material. The cylinder style filter bag has a diameter from 150 mm to 260 mm. Mechanical vibrations and backward air remove the dust. Mechanisms of dust adhesion and life span of bag filters are discussed. A technical report on the plan and method of use of bag filters of the Platt (?) Daniel company is introduced. The effect of dust collection of bag filters and improvement of the materials, dropping devices, and designs in iron manufacturing are discussed. Filter element, pocket chamber, and dropping devices of pocket styl bag filters are discussed.

24126 APTIC NO. 43758

Itakura, T., T. Hashimoto, and Y. Meguro

OFF-GAS RELEASE MANAGEMENT OF NUCLEAR POWER PLANT. (CHARCOAL BED TYPE RARE GAS HOLD-UP SYSTEM). *(Genshiryoku Hatsudensho no hoshasei kitai hoshutsu kanri). Text in Japanese. Kuki Seijo (Clean Air - J. Japan Air Cleaning Assoc., Tokyo), 10(2):16-22. June 1972. 4 refs.*

A general discussion and example are given on the off-gas release management of nuclear power plants. The gas from a pressure water reactor is usually stored under pressure using a gas compressor by which the radioactivity is decreased, and after it is treated with a high capability air filter at atmospheric conditions, it is diluted and discharged. The waste gas from the air extractor of the turbine condenser at a boiled water reactor is first preheated and the hydrogen and oxygen are allowed to react and form water. The residue gas is then compressed and stored in a decay tank, or treated with activated carbon, and released after the treatment with a high capability air filter and dilution. The waste gas from the condenser of the boiled water reactor is kept in the decay tube for 2 minutes before being passed through the high capability air filter and released. A gas hold-up apparatus used at the power plant is demonstrated. Activated carbon is used as an adsorbent by which radioactive gas is retained and can decay. Experiments using krypton-85 and xenon-133 as samples reveal that the gases are retained and decay as expected.

24127 APTIC NO. 43863

Jackson, Jesse, Jr.

TOTAL UTILIZATION OF FLY ASH. *Bureau of Mines, Washington, D. C. and IIT Research Inst., Chicago, Ill., Proc. Mineral Waste Utilization Symp., 3rd, Chicago, Ill., 1972, p. 85-93. 9 refs. (March 14-16.)*

Progress was made in demonstrating the feasibility of a proposed flowsheet for the total utilization of a powerplant-generated fly ash. The flowsheet takes advantage of the existing commercial Enercon-Stirling process for production of low-cost iron oxide, carbon, pozzolan, and lightweight aggregate, and expands it by diverting beneficiated nonmagnetic fly ash or pozzolan streams into alumina, regulated-set, and portland cement production. Greater than 90% alumina was recovered from fly ash by either the lime soda-sinter-leach technique or the lime-sinter-leach technique. Good quality regulated-set and portland cements were made by clinkering a mixture of recovered alumina, limestone, beneficiated fly ash, and the calcium silicate residues from the lime-sinter alumina recovery process. Preliminary results are also presented from studies directed toward expanding the proposed flowsheet to encompass waste silico-fluorides from superphosphate fertilizer production. Recommendations for future research are made. (Author conclusions modified)

24128 APTIC NO. 43906

Jahn, G.

DUST TECHNOLOGY. *(Staubtechnik). Text in German. VDI (Ver. Deut. Ingr.) Z. (Duesseldorf), 114(9):646-652, June 1972. 59 refs.*

A literature survey on dust collection problems, on dust collectors, and on the measurement of dust concentrations is given. Foundries spend, on the average, $1.40/ton of iron for the dust cleaning of their waste gases. Regenerative melting furnaces for white and brown gases emit 14,000 to 28,000 cu m/hr of waste gases. Teflon filters are used for sampling for the temperature of 180 to 200 C. The dust concentration is 66 mg/cu m and 94 mg/ cu m. The particle size fluctuates between 0.11 micron and 0.13 micron. In cyclones, fine particles are not separated as well as coarse particles. In a mechanical separator operating on the principle of dust collection through deflection, the collection efficiency for coarse dust, with 76% of the particles being larger than 10 micron, is about 95% and for fine dust with 43% of the particles being larger than 10 micron, it is 82%. Cloth filters for dust collection are extensively discussed in the literature, particularly their use in the cement industry. An experimental set-up has been developed which permits the observation of the collection of particles on the fibers. Quartz particles of 5 and 10 micron adhere less to the fibers with increasing speed. The performance of electrostatic precipitators was studied with an experimental filter. An extensive discussion of wet collectors is also included. For the measurement of dust concentrations in stacks, a mobile Lidar system was used for the first time in England. The use of a filter of polyvinylchloride fibers with a high collection efficiency for particles with diameters of more than 0.1 micron is reported in the literature. Papers were dedicated to the errors of dust measurement and to the method of continuous dust measurement.

24129 APTIC NO. 43905

Kaehr, Walter

REMOTE HEATING AND ENVIRONMENTAL PROTECTION. *(Fernwaermeversorgung und Umweltschutz). Text in German. Chem. Rundschau (Solothurn), 25(25):785, June 21, 1972. 10 refs.*

The main cause for local air pollution is the rapid urbanization of Switzerland. In most residential areas individual oil heating systems are used. The fuel oil consumption rose to the tenfold/ capita between 1950 and 1970, from 124 kg to 1284 kg/capita. Light fuel oil replaces the domestic coal, and heavy fuel oil the industrial coal. Motor vehicles are one of the major pollution sources. They emit sulfur dioxide, nitric oxides, and soot, and unburned oil. For an improvement in the situation, central heating systems for 500 and more apartments or homes are being installed. The idea of connecting entire urban areas to a remote heating plant is not new. In Scandinavia, 90% of the homes in a city may be connected to a remote heating plant. In Switzerland, the cities of Geneva, Lausanne, Bern, Zurich, and Basel possess remote heating systems. In Zurich there are two remote heating systems and a third one is being built. For the future, the construction of nuclear remote heating plants is planned.

24130 APTIC NO. 44297

Kagiya, Tsutomu

POLLUTION FREE COMBUSTION. *(Mukogai shinnenshoho). Text in Japanese. Kagaku Kogyo (Tokyo), 23(7):957-961, July 1972.*

The perfect combustion of oil produces carbon dioxide and water. However, the high temperature required for perfect combustion causes the oxidation of nitrogen and photochemical smog. Therefore, perfect combustion and the prevention of nitrogen oxidation are important for non-pollution. The formula for the chemical reaction of combustion and the speed of reaction are demonstrated. Photochemical air pollution by

combustion is discussed with chemical formulas. The low temperature combustion, which is done by physically using multiple stage, long time, diluted gases, is discussed. The chemically perfect combustion is done by accelerating the combustion speed by decomposing hydrocarbons to hydrogen and carbon monoxide or CO2. The chemical formulas of this process are demonstrated. Hydrogen, CO, and formaldehyde are used to accelerate the combustion speed. The experiment shows that heavy oil with vapor, methanol, and formaldehyde is burned perfectly without soot. The experimental results of the combustion of automobile exhaust oil with vapor shows that CO and nitrogen oxides decrease because of the vapor.

24131 APTIC NO. 44306

Kanematsu, S.

PROBLEMS OF DUST COLLECTION AT GLASS FACTORIES AND COUNTERMEASURES. *(Garasu kojo ni okeru shujin mondai to sono taisaku). Text in Japanese. Kuki Seijo (Clean Air J. Japan Air Cleaning Assoc., Tokyo), 10(3):39-49, Aug. 1972. 8 refs.*

A general discussion is given on dust collection at a glass factory. Materials for glass manufacturing, such as quartz sand, feldspar, and limestone, are supplied as powders, and the sizes of the particles depend on the requirements. The national standards for the dust content in the flue gases from glass factories are 0.20 g/n cu m for more than 40,000 N cu m/hr and 0.40 g/N cu m for less than 40,000 N cu m/hr of flue gas from a glass melting furnace, and 0.20 N cu m/hr and 0.30 N cu m/hr for the flue gas from a boiler. The dust control device usually consists of a collector and dust treating equipment, and the designations of hood and duct are important. The dust contents in flue gases are successfully decreased to 0.03-0.04 g/N cu m at many factories by using a bag filter, bubble filter, or electrostatic precipitator.

24132 APTIC NO. 43813

Kashibe, Jiro

CYCLONE IN A GARBAGE INCINERATOR. *(Jinkai shokyakuro ni okeru saikuron). Text in Japanese. (Nitto Machine Manufacturing Co., Ltd. (Japan)) Japan. Pat. Sho 47-9400. 3p., April 10, 1972. (Appl. Jan. 12, 1970, 1 claim).*

This invention relates to a new cyclone device for a garbage incinerator. A pair of ducts are equipped in the stack of the incinerator, and on top of each duct there is a cyclone with a gas outlet tube which leads the clean gas to the exit. Flue gases, containing particulates, are led into the cyclones through the pair of ducts. By the actions of the cyclones, the particulates are separated from the gases and collected in two collectors which attach to the bottom of the cyclones. Flue gases, free of particulates, are allowed to pass through the gas outlet tubes into the gas collecting chamber and are discharged from the exit.

24133 APTIC NO. 43948

Kawamoto, Takashi

DUST ELiMINATION DEVICE. *(Jojin sochi). Text in Japanese. (Sanyo Electric Appliances Co., Ltd. (Japan)) Japan. Pat. Sho 47-9405. 2p., April 10, 1972. (Appl. June 18,1969, 1 claim).*

This device relates to the improvement of filter exchange in the dust collection device of an air conditioner. A V-type heat exchanger is used to provide a larger area for heat exchange. A frame with an open side is attached under the heat exchanger. The filter is placed into the frame through the open side and the detachment of the filter is prevented by two stoppers. By this arrangement, the heat exchanger and filter can be designed as large as possible, and the attachment and removing of the filter can be easily performed.

24134 APTIC NO. 43810

Kawauchi, Kaoru

STACK GAS DESULFURIZATION DEVICE FOR OIL FUEL BOILERS WITH WATER HEATER. *(Kyusui yonetsuki o moketa juyu boira no haien datsuryu sochi). Text in Japanese. (Yoshimine Boiler Engineering Co. (Japan)) Japan. Pat. Sho 47-10635. 2p., April 19, 1972. (Appl. July 18, 1970, 1 claim).*

This invention relates to a cycling type flue gas desulfurization device equipped with a water heater. Water is stored at the bottom of a vertical tank with a flue gas inlet tube extended into the wall just above the surface of the water. A heat exchanger is equipped in the water chamber, through which heat is carried out by introducing cold water. A water pipe is extended from the lower part of the water chamber into the top of the tank, where it is divided into two pipes at different levels. A spray nozzle is attached to the end of each pipe. Chemicals are injected into the water, which is pumped from the water chamber before it is sprayed from the two nozzles. Sulfur oxides in the flue gas are removed as sulfur compounds through the hole at the bottom of the water chamber after being washed by the chemical solution and precipitated in water. Clean gas is discharged from the top of the tank.

24135 APTIC NO. 43950

Kimura, Atsuo and Terukazu Kadoya

AIR CLEANER ELEMENT. *(Ea kurina eremento). Text in Japanese. (Toyo Filtering Appliances Co., Ltd. (Japan)) Japan. Pat. Sho 47-9404. 2p., April 10, 1972. (Appl. April 19, 1969, 1 claim).*

This invention relates to an air cleaner with a mixture of fibers, phenol resin, and silicon resin as the filtering layer, and a thin layer of silicon resin on one or both sides of the mixed layer. Various kinds of fibers, the main filtering material, are first mixed with phenol resin particles and then with silicon resin particles to form a mixed layer in which the three components stick together. A thin layer of small silicon resin particles is added to one or both sides of the mixed layer. By the synergistic effect of the two resins, the hydrophobic activity of the filtering layer is largely improved, and by the action of the thin silicon layer, the clogging of the filtering layer is prevented.

24136 APTIC NO. 43778

Kitani, S., J. Takada, and S. Uno

REMOVAL OF RADIOIODINE FROM FLOWING HUMID AIR AND STEAM BY IMPREGNATED CHARCOALS. *(Genshiro-yo tenchaku kasseitan ni yoru hoshasei yoso no hoshu). Text in Japanese. Kuki Seijo (Clean Air - J. Japan Air Cleaning Assoc., Tokyo), 10(2):63-70, June 1972. 9 refs.*

Results of experiments on the collection of radioactive iodine and methyl iodide from flowing humid air and steam by impregnated charcoal and the rescattering of the MeI are given. Three kinds of impregnated charcoals, were used for the studies. Iodine or MeI labelled with I-131 was passed through cartridges, each 3 cm in diameter and 1 cm in thickness, at a concentration of about 5 mg/cu m. The penetration of 12 in cartridges is very small at the first cartridge, but largely increases in the second cartridge. Contrary to iodine, the pentration of MeI is no different between cartridges, and the collection efficiency depends not only on the impregnated chemical but also on the thickness of the cartridge layer. The three impregnated chemicals have almost the same collection efficiency. A continuous study of the MeI scattering reveals that the scattering occurs for approximately 6 hours at a total of 0.6%.

24137 APTIC NO. 43811

Kobayakawa, Takashi

AUTOMOBILE DIESEL ENGINE EXHAUST CLEANING DEVICE. *(Jidoshayo dizeru kikan no haiki joka sochi). Text in Japanese. (Daihatsu Motors (Japan)) Japan. Pat.*

Sho 47-10573. 2p., April 19, 1972. (Appl. Sept. 9, 1967, 1 claim).

This invention relates to a new exhaust cleaning device for an automobile diesel engine. There are two exhaust pathways, one with a muffler for carbon removal and the other without a muffler. When the accelerating pedal is moved to a certain position, the circuit of a system including the battery and an electromagnetic valve is closed. By the motion of a rod, which connects the electromagnetic valve and a close-open valve for the pathway with the muffler, this pathway is opened; meanwhile, the other pathway is closed. The exhaust system can also be controlled by the driver using a switch at the drivers seat. In a less polluted area, the pathway with muffler can be closed.

24138 APTIC NO. 43866

Kobayashi, Toshiharu

AUTOMOBILE EXHAUST PIPE. *(Jidoshayo haikikan). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 47-10572. 3p., April 19, 1972. (Appl. Aug. 10, 1967, 1 claim).*

This device relates to an automobile exhaust pipe where oils in the exhaust gas are removed and gas mists are vaporized. Gas is introduced into a main tube and passed through a net into a sub tube. Meanwhile, air is introduced to the spaces between the sub tube and an outer pipe which is jacketed on the main tube. The gases blow on adsorption balls in the sub-tube and the oil content and unburned fuel are adsorbed by the adsorption materials, such as cotton, in the balls. Parts of the resulting gas, which contains gas mist, pass through another net into the next sub-tube where the same process is repeated, and parts of the gas pass through small holes on the wall of the sub-tube to the space where it is diluted by the stored air. The diluted gas is passed through holes between the spaces and the process is repeated until the gas is purified and released.

24139 APTIC NO. 44221

Kundel, Heinz

COAL CUTTING TECHNIQUE IN EUROPE. *(Schraemladertechnik in Europa). Text in German. Glueckauf (Essen), 108(14):563-572, July 1972. 41 refs. (Presented at the Westfaelische Berggewerkschaftskasse, Technical and Scientific Conference, Bochum, West Germany, Nov. 23, 1971.)*

Coal cutting technique and related dust control measures as used in pit coal mines in Europe are reviewed. No satisfactory solution to the dust control problem has yet been found, and many developments are in experimental or pilot stages. Water sprays from inside and/or outside nozzles are commonly used for roll cutters. Experiments with wetting and foaming agents as well as ultrasonics are in progress. A special procedure used in England applies a spray tube inserted in the roll drive shaft; the small amount of pressurized water admitted to the spray tube carries large amounts of air at high velocity, thus forming a fine mist. The application of a limited number of large cutting bits decreased the specific dust emission by about 50%. Other possibilities are reducing the rotation speed of the roll or using combined exhaust and dust collector systems.

24140 APTIC NO. 43815

Kuwabara, Keisuke and Sachio Hirai

DUCT INNER WALL WITH NO DUST ADHESION. *(Funjin nado no fuchaku o boshi suru dakuto naiheki). Text in Japanese. (Ishikawajima-Harima Heavy Industries (Japan)) Japan. Pat. Sho 47-9586. 3p., April 11, 1972. (Appl. Sept. 19, 1970, 1 claim).*

This invention relates to a new duct inner wall which prevents the adhesion of particles. Air boxes with porous plates as walls are attached to the inner wall of the duct, and refractories are packed between the air boxes. High pressure clean air is introduced from outside the duct by an air tube into the air boxes and then into the duct. A thin air film is thus formed between the surface of the porous plate and the hot gas containing a large amount of particulates. The adhesion of particulates on the wall of the duct is effectively prevented by this air film. The high pressure clean air also provides the effect of heat exchange, so that no refractory materials are needed in the air box.

24141 APTIC NO. 43951

Machii, Yoshio

MEMBRANE FILTER REVERSE SCRUBBING AND INSPECTION DEVICE. *(Menburen firuta no gyakusen oyobi kenko sochi). Text in Japanese. (Tokyo Micro-Science Co., Ltd. (Japan)) Japan. Pat. Sho 47-16718. 3p., May 17, 1972. (Appl. Oct. 22, 1969, 1 claim).*

This device relates to an apparatus for the reverse scrubbing and inspection of clogged pores of a membrane filter. In a syringe type cylinder, an inner cylinder is placed with the elastic ring end tightly attached to the inner wall of the outer cylinder and serves as a piston. A valve rod, which has a valve at the end that can tightly close the elastic ring, is screwed to the inner cylinder at the top. The membrane filter is fixed at the bottom of the outer cylinder. When the valve rod is screwed down with the valve opened and the inner cylinder is pulled upward, liquid for filtration is sucked into the outer cylinder through the inner cylinder and valve. The valve is then screwed up to close the valve and the inner cylinder is pushed to press the liquid passing through the membrane filter and discharged through a cork valve at the bottom of the outer cylinder. The clogged membrane filter can be washed by a reverse operation and the performance of the filter can be inspected by the sizes of the particles which pass through the filter with the liquid and which are collected in a receiving tank.

24142 APTIC NO. 44025

McCrea, D. H., G. J. Cinquegrane, R. J. Leister, and A. J. Forney

EVALUATION OF SOLID MINERAL WASTES FOR REMOVAL OF SULFUR FROM FLUE GASES. *Bureau of Mines, Washington, D. C., and IIT Research Inst., Chicago, Ill. Proc. Miner. Waste Util. Symp., 3rd, Chicago, Ill., 1972, p. 153-160. 5 ref. (March 14-16.)*

The U. S. Bureau of Mines has been investigating the use of solid mineral wastes for removing sulfur oxides from flue gases. A literature survey identified more than 20 materials that are available in large quantity, have thermodynamic potential of reacting with SO2, and can be supplied to the North Central United States for less than $20/ton. Reactivity of these materials toward SO2 was determined experimentally at 130-700 C. In most cases, SO2 was absorbed, but capacity and rate of absorption were low. However, two waste products—red mud and lead-zinc ore tailings—absorbed substantial quantities of SO2. Lead-zinc ore tailings consist primarily of dolomitic carbonates. Their use was evaluated in differential kinetic experiments and by injection into a small pulverized coal-fired furnace. Results showed that injection of the tailings is probably less attractive than injection of limestone. Red mud, the byproduct of bauxite refining, was also studied in differential kinetic experiments and by injection into the furnace. Results showed that, when the injection method is used, the short residence time prevents efficient SO2 removal. Experiments demonstrated, however, that if a reactor is employed to increase residence time, a high degree of SO2 removal can be obtained at 550 C. The red mud can be thermally regenerated at 600 C. A conceptual regenerable process has been suggested. (Author abstract)

24143 APTIC NO. 43907

Merkel, Christian and Joachim Guelland

SOME DUST COLLECTION PROBLEMS IN THE STEEL INDUSTRY. *(Zu einigen Entstaubungsproblemen in der*

Stahlindustrie). Text in German. Neue Huette, 17(5):257-260, May 1972. 20 refs.

Air pollution by steel production plants has been limited to values between 75 and 150 mg/cu m waste gas. The removal of emissions by open-hearth, electric, and cupola furnaces poses no technological problems. The waste gas temperatures behind open-hearth furnaces are between 750 and 1000 C. The waste is composed of 15% carbon dioxide, 10% oxygen, and 75% nitrogen. For dust collection, the dry electrostatic precipitator is used for open-hearth furnaces. For the dust cleaning of the flue gases of arc furnaces, four methods are presently in use with satisfactory results: dry electrostatic precipitation, collection in cloth filters, pease-anthony-venturi-scrubbing, and wet electrostatic precipitation. While first successes were achieved with pease-anthony-venturi-scrubber, there is a clear tendency towards the use of cloth filters for smaller furnaces and dry electrostatic precipitators for larger units. The latter method is also increasingly used for dust collection at cupola furnaces.

24144 APTIC NO. 44076

Mitsuhashi, Hirotaka, Hiroshi Yoshioka, Kaoru Komatsu, and Kazuo Ueta

ARREST EFFICIENCY ON CUPOLA ARRESTER IN WATER SPRAY TYPE. *(Kyupora no shisshiki jojin sochi no jojin koka ni tsuite). Text in Japanese. Imono (Foundry), 44(2):81-87, Feb. 1972. 4 refs.*

The collecting efficiencies of standard cupola dust collectors and some water-spray-type cupola collectors were studied. Cupola collectors were set in the cupola in the foundry. Collecting efficiency was calculated by the formula: n equals W sub O divided by W, where W sub O is the inlet dust volume in the collector and W is the collected dust volume in the collector. The collecting efficiency of the standard collector was 87% with a water volume of 80/min, and that of the new collectors was 92%. (Author summary modified)

24145 APTIC NO. 43791

Mittelstrass, Manfred, Bernd Knabe, and Ursula Knabe

DEVELOPMENT TRENDS OF FLUE GAS DESULFURIZATION *(Entwicklungstendenzen der Rauchgasentschwefelung). Text in German. Energietechnik, 22(5):216-220, May 1972. 26 refs.*

The difficulty of desulfurization lies in the small sulfur dioxide concentrations and in the large quantities of flue gases to be treated. A soft coal-fired boiler, with a capacity of 160 tons of steam/hr, produces 300,000 cu m flue gas/hr which must be desulfurized. The many desulfurization methods can be roughly grouped into wet and dry methods. Alkaline substances in a dry or dissolved state, carbon containing adsorbents, and heavy metal catalysts are mostly used as desulfurization materials. An older classical wet method uses ammonia compounds for desulfurization. It operates at temperatures between 10 and 50 C. Sulfur dioxide and ammonium sulfate develop as end products. The degree of desulfurization is high and the consumption of chemicals low. Difficulties are posed by the huge quantities of ammonium sulfate which cannot be reused or dumped without polluting the groundwater. In the combustion engineering process, the additive is added in the dry state. A better SO2 removal is achieved with catalysts, such as iron, manganese, and vanadium oxides and carbon-containing catalysts. Dry methods require less equipment, but generally achieve a lower collection efficiency, than wet desulfurization processes.

24146 APTIC NO. 44090

Miyaji, Eiji

AIR-CLEANING INSTRUMENTS. *(Kuki osen boshi kiki). Text in Japanese. Kuki Chowa Eisei Kogaku (J. Japan Soc. Heating, Air-Conditioning, Sanitary Engrs.), 46(6):576-585, June 1972. 6 refs.*

Dust removers and other air purification devices are summarized. Equipment for removal of solid and liquid particulates includes gravitational settling chambers, inertia-type dust collectors, centrifugal dust collectors, filter-type dust collectors including air filters and bag filters, electric precipitators, and air washer scrubbers. For removal of harmful gases, there are spray towers, venturi scrubbers, and packed towers. Solid filters such as catalyst-coated filters, chemical-dipped or chemical-applied filter, and activated carbon filters are also used for removal of harmful gases. Deodorization methods for removal of offensive odors include venturi scrubbers; cyclone scrubbers; the deodorant solution method in which pure water, sea water, and other chemical solutions are used to absorb odors from emission gases; the bag filter method, the ozone oxidation method; adsorption by activated carbon, alumina gel, silica gel, and other adsorbents; the catalytic oxidation method; and the combustion method. Maintenance of cyclone scrubbers, filters, and electrostatic precipitators is touched on briefly.

24147 APTIC NO. 44000

Mori, Akira

STACK GAS DESULFURIZATION METHOD BY ACTIVATED CARBON. *(Kasseitanho haigasu datsuryu sochi). Text in Japanese. Haikan to Sochi (Piping Process Mach.), 12(3):56-59, March 1972.*

A stack gas desulfurization method using activated carbon has been tested at a test plant of 6000 N cu m/hr and at a pilot plant of 150,000 N cu m/hr. A new device having a capacity of 420,000 N cu m/hr was constructed. A neutralization method was adopted by which the resulting sulfuric acid is first diluted with sea water, then neutralized with limestone, and discarded without precipitates. The activated carbon, after adsorption, is washed with high concentration H2SO4, low concentration H2SO4, and water, and recovered. Stack gas containing 800 ppm of SO2 is subjected to the desulfurization and a rate of higher than 80% desulfurization is desired. The amount of the 20% H2SO2 treated is 5.9 tons/hr, and the amount of limestone consumption is 1.2 tons/hr. The production of gypsum is expected to be 2.1 tons/hr.

24148 APTIC NO. 43798

Morita, Tomijiro

KURHEA-SYSTEM STACK GAS DESULFURIZATION PROCESS. *(Kureha-ho haien datsuryu purosesu). Text in Japanese. Kemikaru Enjiniyaringu (Chem. Eng.), 17(5):497-503, May 1972. 4 refs.*

The Kureha stack gas desulfurization process is now incorporated in three plants to take care of the total volume of stack gas, amounting to 750,000 Cu Nm/hr. The process consists of an absorption process and crystalization process. In the absorption process, the boiler flue gas is cooled and adjusted in moisture and flow at the dust removing section and then led into the absorption tower where sulfur oxides are completely arrested. The water content, accumulated per ton of anhydrous sulfite of soda in the manufacturing system, totals 778 kg, consisting of 635 kg of 50% caustic soda and 143 kg of water produced by the neutralization. In the crystalization process, 50% caustic soda is injected into the absorbent liquor in the crystallizer to obtain crystals of anhydrous sulfite of soda. They are settled and then separated centrifugally. The filtered liquor is recycled into the absorption tower, while the crystals are dryed with hot wind. The sulfur oxides absorption efficiency, measured at the Mitsui Toatsu Nagoya Plant where the average volume of the stack gas emission was 186,000 Nm cu/hr and sulfur oxides concentration at the entrance was 1390 ppm in average, was 90.6%. Wind pressure loss is 200 mm water with a wind volume of 190,000 Nm cu/hr. The product obtained by desulfurization of the stack gas from heavy oil combustion gives a quality coming under JIS No. 2. The operational problems, maintenance, and economy of the Kureha system are also discussed in detail.

24149 APTIC NO. 43960

Murota, Shin, Shinobu Yanagizawa, Sadamori Kitahara, Osami Yoshida, Shiro Noto, Kazuo Sena, Katsuhiko Uemura, and Toyoo Fukuda

ENVIRONMENTAL MONITORING AND CONTROL SYSTEM. *(Sogo kogai kanshi seigyo shisutemu) Text in Japanese. Mitsubishi Denki Giho (Tokyo), 46(5):537-544, May 1972. 9 refs.*

The basic concept and applicable apparatus of a monitoring and control system for environmental pollution are discussed. An air pollution control system usually has the following five functions: recording of pollutant concentration, analyses of pollution conditions, pollution forecasting, pollution control, and quick enforcement of control regulations. In keeping with these functions, a diffusion model corresponding to the control area is being constructed. The location and scale of sources, time, weather factors such as wind direction, wind velocity, atmospheric stability, temperature inversion, and the fixation of diffusion parameters are important for accurate forecasting. Since the atmospheric diffusion mechanism is so complicated and the mathematical model is not yet ready for computer processing, it is necessary that a suitable correction and learning function be preserved to minimize the error between results of calculations and observations.

24150 APTIC NO. 44293

Nagel, Otto, Heribert Kuerten, and Richard Sinn

MATERIAL EXCHANGE SURFACES AND ENERGY DISSIPATION DENSITIES AS SELECTION CRITERIA FOR GAS/LIQUID REACTORS. PART II: CORRELATION OF THE MATERIAL EXCHANGE SURFACE AS A FUNCTION OF THE ENERGY DISSIPATION DENSITY WITH THE AID OF A MODEL. *(Stoffaustauschflaeche und Energiedissipationsdichte als Auswahlkriterien fuer Gas/Fluessigkeits-Reaktoren. Teil II: Korrelation der Stoffaustauschflaeche als Funktion der Energiedissipationsdichte mit Hilfe einer Modellvorstellung) Text in German. Chem.-Ing. Tech., 44(14):899-903, July 1972. 6 refs.*

The dependence of the attainable specific material exchange surface on the operational and constructional parameters is investigated for a series of contact devices, such as: bubble columns with and without jet gassing, agitator vessels, packed columns with direct flow, tube reactor-jets, and Venturi washers. The oxidation of aqueous sodium sulfite solutions with air was used as the model system. The observations are used as a basis for a technical selection criterion for gas/liquid reactors and chemical washers. A model setup shows the dominating influence of the energy dissipation density on the material exchange surface. The model allows a uniform correlation of the experimental results given in Part I, and affords a means for comparing the various types of reactors. (Author abstract modified)

24151 APTIC NO. 43803

Nakagawa, Shikazo

WASTE GAS DESULFURIZATION ACCOMPANIED BY DENITRATION. *(Dassho o tomonau haien datsuryu) Text in Japanese. Kemikaru Enjiniyaringu (Chem. Eng.), 17(5):521-527, May 1972. 1 ref.*

Nitrogen oxides are said to be the chief substances causing photochemical smog. Since they are formed when something is burned at high temperature, the problem of nitrogen oxides pollution cannot be solved by use of low-sulfur fuel. The concentration of nitrogen oxides produced by high-temperature combustion is reportedly comparable to that of sulfur oxides. Their concentration in stack gases is said to be 200-1500 ppm. Although nitrogen oxides can be removed by means of activated carbon or alumina gel with 0.1-0.5% palladium or by a catalyst made of precious metal, such a removal method is too costly to apply to a large-scale plant. Fortunately, the waste gas desulfurization process can perform denitration of the gas if properly adjusted and operated. Also from an economical point of view, such by-products as sulfuric acid, ammonium sulfate, sodium sulfite, and sulfur recovered during the desulfurization process are facing oversupply problems. On the other hand, the demand for gypsum exceeds the supply and is expected to increase considerably each year, indicating an expanded market for gypsum recovered by waste gas desulfurization. Some of waste gas desulfurization processes that produce gypsum as a by-product are discussed. In the direct lime-gypsum method, the insoluble slurry is aerated for rapid oxidation with micro-bubbles of air, thereby becoming quality gypsum in the oxidation tower. Indirect lime-gypsum methods include the ammonia-gypsum process, alkali-gypsum process, dilute sulfuric acid-gypsum process, and magnesium-gypsum process.

24152 APTIC NO. 43706

Nakai, Yoshiho

COLUMN STILL OF DESULFURIZATION CENTER CONSTRUCTED AT THE SHOWA PETROLEUM YOKKAICHI PLANT. *(Datsuryu senta no joryuto: Showa Yokkaichi sekiyu de kensetsu) Text in Japanese. Tekkokai (Iron and Steel Ind.), 22(3):30-34, March 1972.*

The column still system of a desulfurization center at an oil refinery, including a constant pressure column still and a reduced pressure column still, is described. The inside diameter, height, designed temperature, designed pressure, and the pressure obtained from a pressure test for the former are 8500 mm, 57,500 mm, 200 to 400 c, inside pressure 3.5 kg/cm Ct, and 44 kg air/cm Ct. That for the reduced pressure column still are upper column 4200 mm, middle column 7900 mm, and lower column 5000 mm, 35,300 mm, 200 to 400 c, inside pressure 3.5 kg/cm Ct and outside pressure 1.0 kg/cm Ct, and 44 kg air/cm Ct. A chromium-aluminum alloy is used as the interior material, and it is highly anti-corrosive to sulfur and sulfur compounds, and chlorine and its compounds, has excellent welding properties, and has almost the same thermal expansion coefficient as carbon steel. The best design is performed at a given pressure, temperature, wind velocity, and earthquake by a computer program.

24153 APTIC NO. 43812

Nakamura, Harutoki

EXHAUST GAS PURIFICATION DEVICE. *(Haiki gasu joka sochi) Text in Japanese. (Matsushita Denki Co., Ltd. (Japan)) Japan. Pat. Sho 47-14722, 2p. May 2, 1972. (Appl. Dec. 18, 1969, 1 claim)*

This invention relates to a new exhaust gas purification device of high capability and low gas resistance. In a cylindrical chamber, with the gas entrance on one side and exit on the other side, many layers of metal net plated with glass fibers, which is an excellent catalyst supporter, are equipped concentrically. Exhaust gases are introduced into the center of the chamber from the gas entrance, and pass through the metal nets from the most inner layer to the most outer layer. Clean gases are released from the exit on the other side. The catalyst layers are mechanically strong and have a large area which decreases the gas resistance and increases the fuel efficiency. This new device also has the advantages of simple structure and low cost.

24154 APTIC NO. 44208

Nishi, Tokuya

THE USE AND EFFICIENCY OF ELECTROSTATIC PRECIPITATORS AT CEMENT FACTORIES. *(Semento kojo ni okeru denki shujin sochi no shiyo to koka) Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 39(8):752-764, Aug. 1972. 6 refs.*

Dust collection at a cement manufacturing factory is described. The main components of dust in the flue gas from a cement factory are silicon dioxide, alumina, calcium oxide, magnesium oxide, sulfur trioxide, and alkalis, and the dust content in flue gas ranges from 10-30 g/N cu m for limestone rotary driers to 40-80 g/N cu m for suspension preheating kiln (SP kiln). The size of the particles ranges from 0.1 micron to 60 micron, with an average of about 5 to 10 micron. A dry electrostatic precipitator, equipped with an electromagnetic striking hammer, is used for the dust collection of flue gas from the SP kiln, and the dust content is decreased from 70 g/cu m to 0.04 g/cu m. The same apparatus of a different capacity used for dust collection from flue gas of a feed dryer shows that the dust content is decreased from 30 g/cu m to 0.04 g/cu m. The pressure loss in the latter case is only 2 mm Hg.

24155 APTIC NO. 44244

Noll, Paul H.

CATALYSTS FOR WASTE AIR CLEANING. *(Katalysatoren fuer die Abluftreinigung.) Text in German. Chem. Rundschau (Solothurn), 25(31):980, Aug. 1972.*

Catalysts are used primarily for the removal of combustible pollutants from waste air whose concentration is below the point of ignition. Also, they are used for the removal of hydrogen sulfide from waste gases and for the reduction of the oxides of nitrogen. Catalytic afterburning means oxidation of pollutants at low temperatures, usually around 400 C, of the odorless and physiologically harmless components carbon dioxide and water. A catalyst speeds up the chemical reaction. The catalysts usually consist of a carrier with a large surface and a large pore volume bearing metal or metal oxides. Catalysts for afterburning usually have aluminum oxide or aluminum silicate carriers. Such carriers have a temperature tolerance of 900 to 1100 C. The catalysts available for waste air cleaning by afterburning come in various shapes such as granules, balls, agglomerations of balls, honeycombs, or sexagonals. For waste air cleaning, granules or honeycomb catalysts are mostly used. Larger quantities of dusts or fibers pose difficulties for the catalytic afterburning. The waste gas composition is decisive for the selection of the adequate catalyst.

24156 APTIC NO. 44204

Nomura, Katsumi

MERIT OF MIXED COMBUSTION OF HEAVY OIL AND GAS TO AVOID AIR POLLUTION. *(Kogai hassei no yokushi taisaku ni okeru juyu gasu konsho no meritto ni tsuite.) Text in Japanese. Netsu Kanri (Heat Management: Energy and Pollution Control), 24(8):17-20, Aug. 1972.*

The advantages of the mixed combustion of heavy oil and butane gas for air pollution control are described. Butane gas contains no sulfur. By mixing butane gas with C grade heavy oil which contains 2.3% sulfur, a desired sulfur content can be easily obtained, the combustion efficiency of the heavy oil is increased, the excess air rate is largely decreased, the unit calorie cost is reduced, and the operation is easy. However, according to the regulations, butane gas is defined as high pressure gas and a license is required for the storage of more than 2 tons of the gas.

24157 APTIC NO. 43749

Oda, Kenichi, Y. Ishihara, S. Miura, T. Otsuka, Y. Hasegawa, H. Kawamura, and T. Ishii

PRESENT STATUS OF THE REDUCING TECHNIQUES FOR SULFUR OXIDE EMISSIONS CAUSED BY FUEL OIL COMBUSTION. *(Nenryoyu no teiiwoka gijutsu ni kansuru chosa.) Text in Japanese. Denryoku Chuo Kenkyusho Gijutsu Kenkyusho Hokoku (Tech. Lab. Central Res. Inst., Elec. Power Ind., Rept.), 1972:91-95, Feb. 1972.*

Desulfurization techniques available today for fuel and stack gas are discussed. For desulfurization of stack gas or emission gas, both wet and dry techniques are used, including the DAP-Mn, alkalized alumina, Shell, Still, activated carbon, EDF, Wellman Lord, TCA absorption, Stone and Webster ionics, Bischoff, Grillo, and Chemico methods. Due to a disadvantage in the gas diffusion, the wet process is generally regarded not as desirable, but the recent success by Combustion Engineering Co. in this area has encouraged resumption of the research and development in this field. The dry process is more expensive than the wet. Hydrodesulfurization of heavy oil is generally classified into two types, indirect and direct, the former giving a total desulfurization rate of about 40% and the latter, though technically more complicated, assuring about 75%. Another desulfurization technique is gasification in which fossil fuel is gasified through partial combustion as already practiced in producing synthetic gas or city gas. The desulfurization process then is applied to the fuel gas so produced. In this case, the concentration of sulfur compounds is much higher than in the emission gas. The sulfur compounds also take the form of hydrogen sulfide. All combine to make the desulfurization easier.

24158 APTIC NO. 43947

Ogawa, Shunichi

FILTERING DEVICE FOR SOOT AND OTHER POLLUTANTS. *(Baien nado no roka sochi.) Text in Japanese. (Assignee not given.) Japan. Pat. Sho 47-10634, 2p., April 19, 1972. (Appl. June 9, 1970, 1 claim)*

This device relates to a new filtering method for soot and particulates in stack gases. V-type filter plates are placed in a frame in such a way that the top is facing the direction of the incoming gas, and between the plates there are crevices. Water is sprayed on the gases in the same direction, and soots and particulates carrying moisture gather in between the filter plates since the crevices are small. As a result of the pressure difference between the inside and outside of the V-type filter plate, the soot and particulates which pass through the crevices are sucked into the low pressure triangle area and removed through holes which connect to the dust collector. A complete removal of soot and particulates in the stack gas is thus possible by the action of a multiple layer of filters.

24159 APTIC NO. 43870

Ogura, Takeji

AUTOMOBILE NITRITES EMISSION CONTROL FILTER CLOGGING PREVENTION DEVICE. *(Jidosha no chisso sankabutsu haishutsu yokusei sochi yo firuta no memmari boshi sochi.) Text in Japanese. (Nissan Automobile Co., Ltd. (Japan)) Japan. Pat. Sho 47-16308, 3p., May 13, 1972. (Appl. March 6, 1969, 1 claim)*

This device relates to the improvement of emission control filter for automobile nitrogen oxides. An automatic control system which is connected to an exhaust gas recycling device with a filter is used for the control of filter clogging. When exhaust gas, containing a large amount of nitrogen oxides, is emitted from the engine, this high output operation of the engine is automatically detected by the control system. The control system opens the pathway for the recycling of the exhaust gas which, before recycling into the engine, is cleaned by passage through the filter. Clogging of the filter occurs when it is continuously used for this purpose. In this device, an air pump is connected to the filter and, when the engine is emitting exhaust gas containing no nitrogen oxides, air is introduced into the filter automatically, and impurities on the filter are washed and discharged from the exhaust pipe.

24160 APTIC NO. 43929

Okada, Yuji

AIR CLEANER DUST COLLECTION DEVICE. *(Ea kurina yo sokumen fukikomi hoki gasu shugin sochi.) Text in Japanese. (Assignee not given.) Japan. Pat. Sho 47-9423, 2p., April 10, 1972. (Appl. July 9, 1969, 1 claim)*

This invention relates to a dust collection device comprising a main container with water at its bottom, a side tube extending from outside the container and ending above the surface of the water; and a cylindrical filtering system connected to the top of the container. The cylindrical filtering system has two filter nets at the top, a net wall at the lower center part, and a hole at the center of its bottom. Dust-containing gases are introduced from the side tube and directed at the water, causing the scattering of water vapor. The dust is removed due to the increase in its weight caused by the combination with water vapors. The resulting gases then pass through the net wall and emerge from the top of the container as clean air after being filtered by the two filter nets. Water in the filter drops through the hole at the center of the bottom into the stored water at the bottom of the container.

24161 APTIC NO. 43730

Onishi, Shunji

THE USE OF FIBERS FOR THE PREVENTION OF PUBLIC NUISANCE. *(Kogai boshi shizai to shiteno sen-i zairyo). Text in Japanese. Seni to Kogyo (Textile and Industry), 5(3):153-161, March 1972. 31 refs.*

Fibers offer a wide range of application to pollution control; namely, mechanical separation of solids by filtering, removal of particular substances by adsorption, and removal of particular substances by chemical reaction of fibrous material. In connection with a discussion of woven-cloth and packed layer fiber filters for waste gas and water cleaning, the physical and chemical characteristics of natural fibers, synthetic fibers, and inorganic fibers were compared with one another for total strength, specific gravity, heat resistivity, acid resistivity, alkali resistivity, and cost. The use of a filter cloth in a sewage or industrial waste water treatment process or with a rotary drum-type vacuum filter or filter press was generally discussed. Fiber is also used for oil-water separation. In the so-called adsorption method, one of the oil-water separation methods, oil is separated from water by taking advantage of the wetting phenomenon of the fiber surface. The wetting phenomenon occurs when a liquid, whose surface energy is smaller, is placed with a solid whose surface energy is greater. In the case of oil-water separation by means of fiber, the surface energy is, listed in order of the smaller to the larger, oil (petroleum)-synthetic fiber-water, if the synthetic fiber is a polyolefine. The surface of the fiber is thus wetted with oil, not with water. Once wetted with oil, the surface energy of the fiber becomes even smaller, making it even more difficult to wet the fiber with water. An absorption method is also discussed. A fiber has no oil-absorbing power unless it has the inter-molecular cohesive force approximating that of the mineral oil and is made of a low-crystalline material or an amorphous material made insoluble by special processing. Non-woven cloth coated with manganese dioxide catalyst is used to remove harmful gases through a chemical reaction. The chemical reactions of such fiber filters and their characteristics are fully discussed.

24162 APTIC NO. 43930

Ooiwa, Tatsukazu

KD STACK GAS DESULFURIZATION SYSTEM. *(KD haien datsuryu sochi). Text in Japanese. Kogai Boshi Sangyo (Environ. Pollution Control), 2(7):58-65, July 1972.*

The KD flue gas desulfurization system is based on spraying sufficient ammonia gas into stack gas to ensure thorough mixing, by which the ammonia reacts with the sulfur dioxide and sulfur trioxide in the stack gas. Cold water is then sprayed on the mixture and ammonium sulfite is formed. The mixture is washed with water through a cylindrical filter and complete desulfurization and dust removal are achieved. Results from several installations have shown desulfurization efficiencies from 99.45% to 100%. The system also can be used for the removal of chlorine gas and hydrogen chloride gas. More than 99% desulfurization can be obtained when lower grade heavy oils are used. The desulfurization rate of the system is adjustable from 30 to 100%. Costs of entire boiler operations using A grade heavy oil without a desulfurization apparatus and that using B or C grade heavy oil with a KD desulfurization system are calculated and compared. Lower costs and less pollution are found for the latter.

24163 APTIC NO. 43883

Perga, Martin W. and Ted V. DePalma

EXHAUST GAS TREATMENT SYSTEM. *(Universal Oil Products Co., Des Plaines, Ill.) U. S. Pat. 3,657,892. 5p., April 25, 1972. 2 refs. (Appl. June 29, 1970, 3 claims).*

An exhaust gas treatment method and system for an internal combustion engine using a catalytic converter are described, wherein carbon or charcoal is incorporated into the system so that hydrogen and carbon monoxide can be produced by dissociation of the water present in the exhaust gas. The carbon is partially oxidized to become a secondary fuel for a catalytic conversion zone of the converter. At least a portion of the exhaust gases are caused to pass through a bed of carbon under predetermined conditions before their entry into the catalytic converter, intermediate between engine startup and a predetermined high limit temperature. Previous systems which used catalytic converters were unable to maintain sufficiently high temperature levels to increase catalyst efficiency. (Author abstract modified)

24164 APTIC NO. 44609

Phelps, A. H.

IF YOU DON T KNOW THE TUNE, YOU CAN T SOLVE THE PROBLEM. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 21p., 1972. (Presented at the Air Pollution Control Association, Annual Meeting, 65th, Miami Beach, Fla., June 18-22, 1972, Paper 72-148.)*

An attempt to characterize a noise problem is sometimes made using a single decibel level reading. Slightly more sophistication is used in attempting to define a noise problem by using an A-scale decibel level. Both simplified approaches are subject to error in overlooking the major importance of decibel levels in each frequency band, particularly when there are pure tone components present. Annoyance is very strongly dependend on energy content in each frequency band. Noise control techniques are equally dependent on the energy level in each frequency band. Identification of pure tone components, when present, is an extremely useful diagnostic tool for finding and quieting the source. Proposed noise criteria for neighborhoods which reflect the effect of frequency are discussed along with one noise regulation in force in Chicago that avoids the problem of a single decibel level specification. Some case histories are presented and compared with the criteria. (Author abstract modified)

24165 APTIC NO. 43732

Pilz, Kent W.

WET DUST SUPPRESSION BRIGHTENS MINERAL PROCESSING PICTURE. *Mining Engineering, 24(7):81-83, July 1972.*

Wet dust suppression can be achieved by the following: confinement of the dust within the dust producing area with a curtain of moisture, wetting of the dust by direct contact between the particles and droplets of moisture, or the formation of agglomerates too heavy to remain airborne, or too heavy to become airborne, by combining small dust particles with each other and with the droplets of liquid. Performance of dust control compounds is related to surface active agents and surface activity. To reduce the unusually high surface tension and other defects of plain water, special surface active agents are used. These materials are synthetic organic chemicals, composed of two groups exhibiting differing solubility characteristics: one part, usually a long chain hydrocarbon, is the hydrophobic or water hating group, while the other part of the hydrophylic or water loving group and is usually a sulfate, sulfonate, hydroxide, or ethylene oxide. The proper formulation of dust control compounds is considered, including the application of wet dust suppression to ore crushing operations. The wet dust control system utilizes a proportioner and controls to automatically regulate the flow of wetting solution to the system. Applications are indicated when a combination wet suppression and air evacuation system is recommended.

24166 APTIC NO. 44050

Powell, D. T. and R. E. Schwartz

BORCO USES LOW-LEVEL FLARE AT FREEPORT. *Oil Gas J., 70(25): 62-63, June 19, 1972. (Presented at the American Petroleum Institute, Midyear Meeting, New York, May 8-12, 1972.)*

The elevated flare, because of its exposed location and high visibility, is a focal point for neighborhood complaints. Recognizing this, the Bahamas Oil Refining Co. installed a low level flare at its new Freeport, Bahama, refinery. This equipment provides shielded burning of excess gases and has virtually eliminated elevated flaring at this plant. The flare performs well in pollution control of odors, smoke, light, and noise. Design of the flare for the Borco refinery which was set up to process low sulfur crudes is discussed.

24167 APTIC NO. 44223

Rakoczy, T.

NO CLOGGING OF THE NOZZLES AT SCRUBBERS WITH ROTARY ATOMIZERS. *(Keine Duesenverschmutzung bei Luftwaeschern mit Drehzerstaeubern) Text in German. Heizung-Lueftung-Haustechn., 23(6):193, June 1972. (Presented at the Conference on Heating and Ventilation Techniques, Budapest, Hungary, Sept. 8-10, 1970.)*

An experimental horizontal scrubber equipped with rotary atomizers to prevent clogging is described. The atomizer represents a cylinder with small tubes of 10-15 mm diameter on its lateral surface. Water admitted to the inside of the cylinder is subject to the action of centrifugal forces and emerges in the form of fine jets which disintegrate in air. The fine droplets are atomized by a ring located in front of the pipes. The atomizing cylinder is rotated at a speed of about 40 rotations/min. Scrubbers with rotary atomizers are now produced in series, and used primaril in the textile industry.

24168 APTIC NO. 44070

Robinson, E.

FIGHTING POLLUTION WITH ITS OWN WEAPONS. *Eng. Digest (Toronto), 18(2):29-30, Feb. 1972.*

One of the most significant facts of heterogeneous catalysis is the high catalytic activity of the compounds of transition metals. It was recently discovered that polysaccharides can be used in the support and preparation of novel heterogenous catalysts involving transition metals. An active low-temperature catalyst designed to convert automobile hydrocarbon emissions to water vapor and carbon dioxide has been developed from a basic catalyst containing manganese. Supporting the basic catalyst on silica gel increased the activity. A series of hydrocarbons including aromatic compounds, both cyclic and straight chain, of varied molecular weight were used in the evaluation of oxidizing activity. A technique has been devised for incorporating the catalyst in a very finely divided form into sheets which can be fabricated to suit a particular application. New preparative methods are also being applied to well-known catalyst systems. One of the more important areas of investigation is in the control of surface structure with the use of polysaccharide templates.

24169 APTIC NO. 43741

Sakabe, Tsutomu

DESULFURIZATION TECHNIQUES OF HEAVY OIL AND FLUE GAS. *(Juyu oyobi haien datsuryu gijutsu) Text in Japanese. Ryusan (J. Sulfuric Acid Assoc., Japan), 24(2):64-78, Feb. 1972. 120 refs.*

A number of the heavy oil and flue gas desulfurization techniques are reported. The hydrodesulfurization process considered most promising for heavy oil desulfurization is described to explain the basic mechanism and flow of the process. Introduced under the direct desulfurization techniques are the RCD Isomax Method developed by Universal Oil Products Co. and the RDS Isomax Method by Chevron Research Co., both a fixed catalyst bed type. Also discussed under this category is the H-Oil Process, a floating catalyst bed type developed by Hydrocarbon Research Inc. and City Service Oil Co. The flue gas desulfurization techniques are classified into four types, wet-type absorption, dry-type absorption, adsorption by activated carbon, and sulfuric acid gas oxidation. The first, under the wet-type process, uses a suspension of lime as the absorbent, the most well known of which is the process put in practice at the Bettersea and Bankside power plants of London. Another example of this type is the process separately developed by Combustion Engineering Inc. and Universal Oil Products Co. in which lime or dolomite is put into the combustion chamber and the flue gas then scrubbed. The other wet type absorption methods include one using ammonia water solution as the absorbent, another using high-concentration potassium sulfite solution, and another using a suspension of magnesium manganate. Introduced under the dry-type absorption method are the process in which lime or dolomite is added into the furnace, another using an alkaline absorbent, another using manganese oxide as the absorbent, and the last using an organic compound as the absorbent. Discussed under the activated carbon method are the Reinluft, Bergbau Forschung, and Lurgi techniques. Representative of the sulfurous acid gas oxidation method is the Monsanto-Penelec Process.

24170 APTIC NO. 44092

Sakanaka, Hiroo, Soji Mizuno, and Takeshi Nishida

AIR CLEANER FOR INTERNAL COMBUSTION ENGINE. *(Nainen kikan ni okeru kuki seijoki) Text in Japanese. (Kubota Ironworks Co., Ltd. (Japan)) Japan. Pat. Sho 47-10569. 3p., April 19, 1972. (Appl. March 24, 1967, 1 claim).*

This invention relates to an oil-path air cleaner for use primarily in a horizontal internal combustion engine. The air cleaner consists of three detachable parts. The lower part is an oil chamber into which contaminated air is introduced. A shelter is provided through which the air is guided so that it contacts the oil in a perpendicular direction. The middle part consists of steel nets through which the air from the oil chamber is filtered as it passes to the upper part, which is the air chamber for supplying air to the internal combustion engine. The three parts are held together by two screw rods and, when cleaning of the apparatus is desired, the individual parts can be separated. The air cleaner is attached to the gas tank or radiator as part of the entire engine system.

24171 APTIC NO. 43869

Sakazume, Hiroji and Takao Okura

INTERNAL COMBUSTION ENGINE AIR POLLUTION CONTROL DEVICE. *(Nainen kikan no taiki osen boshi sochi) Text in Japanese. (Honda Technical Research Inst. (Japan)) Japan. Pat. Sho 47-10003. 2p., April 14, 1972. (Appl. March 14, 1969, 1 claim).*

This invention relates to an air pollution control device for fuel vapors in the internal combustion engine. A valve is attached to an air inlet tube which supplies air for fuel combustion. The action of this valve corresponds to the operation of the engine. When the engine is stopped, the valve [illegible] by itself due to the pressure decrease in the gas tube [illegible] and fuel vapors are led through a branch tube which extends from the air inlet tube to a filter, by which fuel vapor and impurities are adsorbed and clean gas is released. When the engine is started, the valve is opened and air is introduced. Due to the pressure loss at the branch tube, the adsorbed fuel vapor is desorbed and sucked back to the engine for re-combustion.

24172 APTIC NO. 44196

Satake, Shozo

METHOD FOR REDUCING THE SULFUR CONTENT IN CRUDE OIL STACK GAS. *(Juyu funsho haishutsu gasuchu no io-bun o gensho seshimeru hoho). Text in Japanese. (Greater Japan Tar Co., Ltd., Yokohama (Japan)) Japan. Pat. Sho 47-9401. March 18, 1972. 3p., (Appl. April 24, 1969, 2 claims).*

A method is discussed for reducing sulfur content in stack gas from combustion of crude oil simply by the addition of substances which react with sulfur oxides in crude oil and form thermo-stable salt. Approximately equivalent to five times the amount of sulfur content in crude oil of slaked lime powder and 3 to 10% the amount of the slaked lime powder of soap, or in addition to the above two substances, a small amount of catalyst such as ferric hydroxide which can oxidize the sulfur dioxide into sulfur trioxide, are added to the crude oil and the mixtures are used for a fuel. Experimental results show that 48.8% of the total sulfur content is reduced by the method without the use of $Fe(OH)_3$, and 57.5% are reduced by the alternative method.

24173 APTIC NO. 44245

Schaetzle, P.

ELIMINATION OF GASEOUS AIR POLLUTANTS. PART I: THE THERMAL AND CATALYTIC COMBUSTION. *(Elimination gasfoermiger Luftverunreinigungen I. Teil: Die thermische und katalytische Verbrennung). Text in German. Chem. Rundschau (Solothurn), 25(31):985, Aug. 1972.*

Thermal afterburning assumes an important role in waste gas cleaning. It produces no scrubbing water which must be eliminated and no adsorbent which must be recovered. Prerequisite for an efficient thermal afterburning process is the combustibility of the pollutants. The oxidation should not lead to other undesirable substances (such as chlorine, hydrochloric acid, or oxides of nitrogen). There are two types of thermal waste gas treatment, direct and catalytic combustion. For direct combustion the waste gases are passed into a special combustion chamber where they are heated to more than 800 C. The efficiency of this method is influenced by the residence time and the air surplus. The method is used in the chemical industry, the lacquer and paint industry, the plastics industry, and rendering. The catalytic method uses precious metal (mainly platinum) catalysts on metallic or ceramic carriers for increasing the reaction speed so that the desired conversion takes place at much lower temperatures, usually between 300 and 400 C. This method cannot be used when the waste gases contain substances which impair the activity of the catalyst such as heavy metals, halogens, phosphorus compounds, and arsenic.

24174 APTIC NO. 44115

Schicht, Hans H.

AIR HYGIENE AND AIR CONDITIONING TODAY. *(Luft-und Klimatechnik heute). Text in German. Chem. Rundschau (Solothurn), 25(11):278, 281, March 1972.*

Air hygiene comprises a wide range of tasks from drawing off kitchen odors to drawing off dust-laden air from production machines to waste gas cleaning. In many production processes harmful substances are developed as by-products which must be drawn off at the point of origin. Exhaust hoods must be installed directly above the machine. The drawn-off air is passed on via pipes and suitable ventilators. If dust is the main component in the waste air, it is then cleaned in dust collectors such as cyclones, electrostatic precipitators, and envelope-type and tubular cloth filters. For the separation of gaseous pollutants, numerous methods are available from thermal and catalytic afterburning to absorption or adsorption of the pollutants on a suitable carrier substance. With the aid of high quality air filters, 99.99% of the dust can be retained. These filters are made of finest glass asbestos or glass fibers which are capable of retaining the finest dust particles.

24175 APTIC NO. 43946

Schlesinger, M. D., W. S. Sanner, and D. E. Wolfson

PYROLYSIS OF WASTE MATERIALS FROM URBAN AND RURAL SOURCES. *Bureau of Mines, Washington, D. C., and IIT Research Inst., Chicago, Ill., Proc. Miner. Waste Util. Symp., 3rd, Chicago, Ill., 1972, p. 423-428. 3 refs. (March 14-16.)*

The pyrolysis of organic wastes at 500-900 C yielded gas, liquid, and solid products that could be converted to energy without the pollution effects of incineration or open burning of raw wastes. The process is thermally self-sufficient, usually from the gas produced, and the feed is almost all recovered in the products. Moisture in the feed can affect the product distribution by reaction with the hydrocarbons formed and by participation in the water gas shift reaction. Typical waste materials that are available in large quantities and have been pyrolyzed include scrap tires, municipal refuse, wood waste, battery cases, sludge, and manure. Residue sent to landfill would be sterile and, in most cases, only a small fraction of the original volume. Based on pilot plant data and assuming municipal financing, the costs of pyrolysis range from $5.79 to $1.25/ton for plant sizes treating 500 to 5000 tons of waste/day (wet), respectively.

24176 APTIC NO. 44121

Schmidt, Ernst

REDUCTION OF AIR-POLLUTANT FLUORIDE EMISSIONS BY MEANS OF PULVERIZED HYDRATE OF LIME. *(Verminderung luftverunreinigender Fluor-Emissionen durch Kalkhydrat-Pulver). Text in German. Ziegelind. (Weisbaden), 25(3):1-16, 1972. 16 refs.*

A study was conducted with the aim of reducing the emission of gaseous air pollutants, mainly fluoride compounds, from the raw material in the course of brick firing. The method tested is based on the dry injection of pulverized lime hydrate. The primary objective was to reduce the sulfur oxides concentration, since this had been shown to influence the fluoride emission during firing. The pulverized lime hydrate was injected directly into the kiln. It was found that with a suitable feed, proportioning, and distribution a considerable linkage of the sulfur components may be achieved and also an indirect reduction of the fluoride emissions. The disadvantage of direct feeding into the kiln is that the powder comes in contact with the brick setting. Therefore, the process cannot be used for sintering goods. Considerable drawbacks also arise where large quantities of powder are required. The injection of powder into the smoke flue was tested. Observations of performance showed that, in addition to almost complete chemical linkage of sulfuric acid, favorable results were obtained with fluoride under certain specific conditions. The essential preconditions for this were reaction areas of adequate size, i.e., smoke flues of sufficient length and correct proportions. In the first plant installation with powder feed of one-third into the kiln and two-thirds into the smoke flue, a fluoride emission was down from about 70 mg/cu m to 2.3 mg/cu m. With feed into the smoke flue alone, a reduction of 90% was obtained. These results indicate that the process may be applicable to many brickworks as a means of avoiding damage or of enabling lower chimney stacks to be used.

24177 APTIC NO. 44561

Schoeck, V. E.

IN MECHANICAL DUST COLLECTORS, IT'S THE FABRIC THAT REALLY COUNTS. *Eng. Mining J., 173(1):98-99, Jan. 1972. 3 refs.*

Mechanical collectors using textiles as filter media are among the most versatile systems for removing particulates from air or gas streams; no dust concentration is too light or too heavy, and capacity rates can be widely varied with little effect on efficiency. What makes these filter systems particularly attractive to the mining industry is their dual ability to recover valuable ores and other materials and to abate dust nuisances. The

Carborundum Co. is building a textile research laboratory and pilot plant in Burt, New York, to improve and develop textiles, both in forta and properties. Specific developments will be sought in the areas of abrasion resistance, higher temperature capabilities, chemical stability, dimensional stability, and the control of electrostatic properties that are involved with synthetic textiles. Considerations which are involved in selecting the proper fabric filter media include choice of fiber, yarn, design, finish, and proper fabrication. The design and development of filtration fabrics are discussed.

24178 APTIC NO. 44147

Schoell, G.

WASTE HEAT ECONOMICALLY DESTROYED IN COOLING TOWERS. *(Abwaerme in Kuehltuermen wirtschaftlich vernichten). Text in German. VDI (Ver. Deut. Ingr.) Nachr. (Berlin), no. 27:14-15, July 1972.*

Waste heat from large power production plants can be eliminated in cooling towers whose heat exchanger elements are of polypropylene. The synthetic heat exchanger elements are 40 to 50% less expensive than the conventional metallic heat exchangers. Since overpressures between 2 and 5 atm gage are required, the synthetic heat exchanger elements are cylindrical pipes with an inner diameter of 6 and 10 mm. The wall thickness is 1 mm. The individual pipes are combined by cross connections in a zig-zag pattern and attached to a steel frame coated with a plastic material. On the inner side of the heat exchanger elements in the lower section of the cooling tower, nozzles are arranged for spraying the elements. A 120 m-high cooling tower with polypropylene elements has a cooling capacity of about 775 Gcal/hr at an ambient air temperature of 15 C, a relative humidity of 70%, and a cooling of the circulating water from 37 C to 27 C if the spray nozzles are in action. If they are not in action, the capacity is 180 Gcal/hr.

24179 APTIC NO. 43913

Schwanecke, Rudolf

MAINTENANCE OF CLEAN AIR IN DISCONTINUOUSLY OPERATING CHEMICAL PLANTS. *(Luftreinhaltung bei diskontinuierlich arbeitenden Chemieanlagen). Text in German. Wasser Luft Betrieb, 16(7):205-212, July 1972. 5 refs.*

The large number of emissions by chemical multi-product plants can be roughly grouped into two categories. The first includes inorganic emissions, such as nitric oxide, nitrogen dioxide, chlorine, hydrogen chloride, sulfur dioxide, and hydrogen fluoride. The quantity of these substances emitted is relatively well known from the reaction process or the output. The seecond group includes the organic emissions caused by evaporation losses during storage at the filling and emptying processes, losses during distillation, particularly with vacuum distillation, losses through evaporation during heating processes, filtering and drying of the products, and losses through leakage. A nomogram is given with which the pollutant concentration emitted into the atmosphere at the filling of storage containers can be determined. The knowledge of the vapor pressure characteristics of the pollutant in dependence of the temperature is essential. Two methods for determination of the vapor pressure characteristics are discussed. Methods for calculation of the pollutant quantities emitted during heating processes, distillation, and drying are discussed. For cleaning of the waste gases of the second group, condensation, adsorption, scrubbing, and thermal or catalytic afterburning are suitable methods. A brief discussion of each is given.

24180 APTIC NO. 44084

Schwartz, Stephen M.

EMISSION CONTROL OF AN ALUMINUM BONDING OVEN. *Pollut. Eng., 4(4):45-47, July 1972.*

To metallurgically bond the aluminum fins and tubes together in heat exchangers, the Modine Manufacturing Co. wets the mechanically bound units or cores by a specially formulated bonding liquid, then passes them through a gas-fired oven. As the cores approach bonding temperatures, extremely dense white fumes begin to evolve. On the assumption that the fume from the heated cores was sublimed aluminum chloride, a fiberglass scrubber was purchased for installation on a prototype operation. It was a high energy venturi unit with two fans to draw the fumes through it. A centrifugal mist eliminator was used between the fans and the venturi scrubber. Modifications which were made to this prototype scrubber are indicated, including the design, installation, performance, and costs of the full scale scrubber system.

24181 APTIC NO. 44122

Schwieger, Robert G.

CONTROLLING RADIOACTIVE DISCHARGES FROM WATER-COOLED REACTORS. *Power, 116(8):21-23, Aug. 1972.*

Radioactive gas in light-water nuclear reactors is derived from two basic sources: radiolytic decomposition of the primary coolant (water), which produces hydrogen and oxygen and converts some oxygen into short lived nitrogen-16; and fission product gases, such as xenon and krypton, which escape from fuel rods. These elements remain entrained in the primary coolant until it is deaerated. In a boiling water reactor plant, deaeration occurs in the condenser. Hence, all noncondensable gases removed by the air ejector must be processed by the off-gas treatment system. In the pressurized water reactor, gases remain in the primary system until the coolant is depressurized on a batch or continuous basis. With the batch process, coolant is degassed before adjusting its boron concentration, while in the continuous process, boron concentration is changed without first removing gaseous fission products from the primary coolant. This is accomplished in a system of heat exchangers and demineralizers that uses the tendency of certain ion exhange resins to retain or release borate ions, depending on temperature. Charcoal adsorption, cryogenic distillation, and pressurized tank processes appear most feasible for minimizing discharges of radioactive gases from boiling water reactor plants. Costs and ways to increase efficiency are mentioned, as well as approaches to defining levels of radioactivity and radiation exposure.

24182 APTIC NO. 44266

Shaw, F. M.

IRON FOUNDRIES AND THE REQUIREMENTS OF CLEAN AIR LEGISLATION. *(Le fonderie di leghe ferrose e norme contro l inquinamento atmosferico). Text in Italian. Fonderia Ital., 21(4):123-128, 1972.*

Pollutants emitted by cupola furnaces consist of smoke from oil and grease covered scrap, sand, coke, rust, and limestone particles, metal oxides from raw material, silica from refractory material, and some sulfur dioxide from sulfur in the coke. The smoke generated during ignition of the furnace can be eliminated by the use of gas or oil burners, but smoke from dirty scrap can be better controlled by waste gas from the cupola which contains 10-20% carbon monoxide. Seven to 11 kg of particulates are emitted/ ton of fused metal. According to British regulations, cupolas producing 3 tons/hr can control this emission by using dry dust arresters; cupolas producing 5 tons/hr by scrubbers. Stacks discharging cupola oven emissions must be at least 20 m high and in urban areas at least 36.5 m high. New cold blast furnaces producing more than 7 tons/hr must be equipped with dust separators and must not emit more than 115 mg/cu m particulates and the purified waste gas must be discharged by stacks from 21 to 45 m high, depending on cupola size. Where possible all gases must be purified during fusion and completely burned burned before discharge to eliminate CO. The emissions from large cupolas must be almost invisible. The cost of a high energy scrubber for a 5 ton/hr cupola is about $30,000, where multiple cyclones are needed the cost is very high. For burned and cooled waste gases, filters can be used. No specific emission limits govern the discharge of smoke or odors from the core and casting departments other than regulations governing offending odors and emissions of substances harmful to health. The emission of particulates from the trimming, grinding, and finishing of metal castings is governed by the Clean Air Act of 1956 and stack height of new installations by implementation regulations of section 10 of the Clean Air Act of 1956.

24183 APTIC NO. 43708

Sheppard, Stanton V.

PARTICLE COLLECTION WITH PACKED CROSSFLOW SCRUBBERS. *J. Air Pollution Control Assoc., 22(4):278-281, April 1972. 6 refs.*

Wet scrubber designs vary widely in their mass transfer and particulate collection capability. Engineers selecting such equipment must be careful to examine factors of scrubber design, such as number of mass transfer units available, number of mass transfer units that can be added in the future, pressure drop vs. mass transfer efficiency, particulate collection efficiency vs. pressure drop, and reliability of operation. The wet packed scrubber is differential in that absorption efficiency is a function of packing depth, and normally a packed scrubber can be designed to give any desired collection efficiency. Integral or primary units, such as wet scrubbers of spray chamber design, impingement plate design, and venturi design, have a fixed number of transfer units available, and are frequently used with a differential type scrubber, known as a tailgas scrubber, to obtain flexibility of operation. The packed crossflow scrubber can serve as a primary scrubber and as a tailgas unit. The crossflow packed scrubber has an inherent lower pressure drop than the counter current packed scrubber. For particulate removal, the crossflow scrubber design is more effective than the counter-current or cocurrent scrubber, because its geometry permits scrubbing liquid to be varied across the depth of packing, allowing high flushing rates in the packing zones where the total mass of solid collection is greatest. Also, the gas and liquid streams do not oppose each other at the packing support plate, thus preventing solids deposition and buildup in that area. The two basic types of packing used for wet packed scrubbers are extended surface packings and filamentous packings.

24184 APTIC NO. 43762

Shimoda, Masaru

SMOKE DESULFURIZATION THROUGH SHINKOSHI-OJI SYSTEM. *(Shinkoshi- ojishiki ni yoru haien datsuryu). Text in Japanese. Kemikaru Enjiniyaringu (Chem. Eng.), 17(5):491-496, May 1972.*

A newsprint manufacturing plant consumes much steam and electric power. The Oji's Tomakomai Plant, an ultra-large-scale newsprint manufacturing plant, therefore has its own thermal power plant using heavy oil as fuel. The process to desulfurize the stack gas and recover sodium sulfite from the sulfuric acid gas and chemicals used in the paper manufacturing process was studied in a large scale test plant. The test plant, using the Shinkoshi process, was examined to see if the process could be readily applicable to a large-scale plant. The Shinkoshi process features several units of 10-mesh wire screens arranged in a zig-zag form, the screen meshes forming a liquid membrane when water or chemical is applied. The gas is thus cleaned as it flows through the meshes. With some modifications made to the process, satisfactory absorption efficiency in the large-scale operation was obtained, including about 95% sulfur dioxide absorption achieved with a 9-stage screen. Formation of sodium sulfate was found to increase in the gas with an increase of oxygen. Pressure loss increases with smaller mesh size. Based on these findings, a large-scale smoke desulfurization plant of the Shinkoshi-Oji system that handles up to about 700,000 cu Nm/hr has been designed for installation in the Tomakomai. The basic process flow of the plant and its economy are described.

24185 APTIC NO. 43807

Shimokawa, Mitsuo and Yukio Yamazaki

OPERATING CONDITIONS OF A TSUKISHIMA-BARCO TYPE STACK GAS DESULFURIZATION DEVICE. *(Tsukishima-Barco ho ni yoru haien datsuryu sochi no unten jokyo). Text in Japanese. Kemikaru Enjiniyaringu (Chem. Eng.), 17(5):504-509, May 1972.*

The half-year, or 5000-hr, operating record of the stack gas desulfurization device installed at the Yoshinaga Plant is presented. It is a wet type desulfurization process which is designed to recover the by-product. The process is a Tsukishima- Barco system originally developed in Sweden. In this device, the flue is equipped with a fan to force the flue gas to flow into the scrubber, where caustic soda solution is sprayed onto the gas. As the gas rises together with the caustic soda solution, the reaction is performed and gas-liquid separation is made by the spiral flow. The treated gas is discharged from the 72-m stack into the atmosphere. The device, consisting of three units of a Tsukishima- Barco No. 50 type scrubber, each rated for 75,000 cu Nm/hr, has been found capable of handling 269,500 cu Nm/hr, or more than the rated capacity of 225,000 cu Nm/hr. The chemical reaction taking place in the scrubber is shown. The daily performance record of the desulfurization device during the month of January 1972 is shown. Installed with the boiler consuming 16,076 kl/m of heavy oil, it desulfurized the flue gas of 1153-1107 ppm at the entrance to 45.1 ppm at the exit. Stainless steel is used in the main parts, such as the scrubber and the upper portion of the stack. A gravimetric analysis is being conducted to obtain data on the possible corrosion of the materials. The data obtained so far are tabulated and seem to indicate no problem in this respect. Both the desulfurization and dust removal efficiencies, even after 5000 hrs of operation, are the same as those given during the test operation. Calculated on the basis of the results obtained by the gravimetric analysis, the service life of the device is estimated at 58 years.

24186 APTIC NO. 44126

Shinume, K., Y. Satomi, K. Hosaka, H. Kagaya, K. Akiba, R. Nishiyama, F. Mizutori, M. Iwata, I. Iguchi, and T. Ota

HYDROGENATION CATALYST AND ITS CARRIER. *(Suisoka datsuryu shokubai oyobi sono tantai). Text in Japanese. (Ministry International Trade and Industry (Japan)) Japan. Pat. Sho 47-13488. 6p., April 24, 1972. (Appl. March 27, 1968, 2 claims)*

This invention relates to hydrodesulfurization catalysts and supporters. Alumina gel, which mainly consists of bohmite and has a Hammett acid function (Ho) below 1.5 in non-aqueous solution after being baked at 300-700 C and degasified at 400-600 C, is used as the catalyst supporter for the hydrodesulfurization of hydrocarbon oil. One or more of the metals from the second, fourth, fifth, sixth, and eighth groups of the periodic table, supported by alumina gel, is used as the catalyst for the hydrodesulfurization of hydrocarbon oil, especially residue oil. Neutral red, methyl red, dimethyl yellow, and benzeneazodiphenylamine are used as indicators for the determinations of the acid values. Results from the experiment using 15% by weight of molybdenum trioxide and 3% by weight of nickel oxide as catalyst and alumina gel as supporter for the hydrodesulfurization of constant pressure distillation residue oil, which contains 4.01% by weight sulfur, at 410 C, 100 kg/sq cm and LSV of 1/hr reveal that the rate of desulfurization is as high as 78% after 50 hours of reaction. The rate using commercial alumina gel as supporter is about 64%.

24187 APTIC NO. 44003

Shirai, Tsuguma

AUTOMOBILE EMISSION CONTROL SYSTEM. *(Jidosha kogai taisaku kiki). Text in Japanese. Mitsubishi Denki Giho (Tokyo), 46(5):545-551, May 1972. 10 refs.*

Outlines of automobile exhaust control devices are given. There are three modes of automobile exhaust, about 25% of the hydrocarbons as blow-by gas, 20% as evaporated gas, and gas from the exhaust pipe which includes 55% of the total hydrocarbons, carbon monoxide, nitrogen oxides, and lead compounds. By using a crankcase emission control valve, the blow-by gas is returned to the intake manifold for recombustion. A purge control valve, which uses the adsorption-desorption characteristic of charcoal, was developed for the control of evaporated hydrocarbons. The flow characteristics of the purge control valve are such that the amount of flow increases as the negative pressure of the venturi increases. A heated intake air system, which consists of a vacuum control, thermo-valve, and shutter, is used for the control of the exhaust gas. An exhaust control system for a rotary engine and many other devices for exhaust control are also described.

24188 APTIC NO. 43856

Siminski, V. J. and F. J. Wright

THE EFFECT OF HOMOGENEOUS ADDITIVES ON THE AUTOIGNITION OF HYDROCARBON FUELS. *Preprint, American Inst. of Aeronautics and Astronautics, New York, 11p., 1972. 8 refs. (Presented at the American Institute of Aeronautics and Astronautics Aerospace Sciences Meeting, 10th, San Diego, Calif., Jan. 17-19, 1972, Paper 72-71.)*

For practical considerations, the design of advanced, high-speed combustion chambers requires that the fuel ignite and burn to completion in as short a time as possible. Ignition delays of a number of vaporized hydrocarbons which were injected into a stream of unvitiated air were measured between 950-1300 K, and the effects of molecular structure, temperature, and additives were determined. A variety of compounds that included peroxides, esters, polyethers, and alcohols were tested. Of these, nitrate and nitrite esters were by far the most effective. Nitric oxide or nitrogen dioxide by themselves dramatically accelerated the ignition of all the hydrocarbons. The addition of nitrous oxide, water, carbon monoxide, or oxygen had no effect. Although hydrogen by itself had no effect on the ignition delay of the fuels, the effectiveness of nitric oxide was greatly enhanced by the addition of hydrogen. At 1000 K, the ignition delay times of high density hydrocarbons-- Shelldyne-H or the hydrogenated dimer of methylcyclopentadiene-- decreased from 180 and 110 miliseconds to 3.5 and 5.3 milliseconds, respectively, upon the addition of 25 volume% n-propyl nitrate. (Author abstract modified)

24189 APTIC NO. 43795

Spitz, Albert W. and Milton I. Schwab

NEW DEVELOPMENTS IN SMELTING SECONDARY COPPER. *Bureau of Mines, Washington, D. C., and IIT Research Inst., Chicago, Proc. Mines. Waste Util. Symp., 3rd, Chicago, Ill., 1972, p. 265-268. 1 ref. (March 14-16.)*

Improvements in both the production of black copper from secondary sources and the subsequent conversion of black copper to blister copper, obtainable through the use of oxygen in blast furnace operations are described. Chemically, the oxygen process can handle black copper, matte, scrap, and other copper bearing materials containing high percentages of impurities such as nickel, arsenic, and antimony, and produce a better grade of blister or fire-refined copper than can be produced by conventional practice. The size of the furnace is considerably reduced, no tuyeres, jets, or lances are required; refractory wear is minimized, and is uniform. The required air-pollution control system is only about one-fourth the size of that required for a conventional converter of the same capacity. If matte is charged to the unit, the sulfur dioxide content of the flue gas is several times as high as if air were used, making the recovery equipment substantially less expensive. The pollution control system now being used on the unit is based on a high-energy venturi scrubber with a variable throat area.

24190 APTIC NO. 44188

Squires, Arthur M.

BINDING SULFUR IN THE PROCESS OF ENERGY GENERATION. *(Die Bindung von Schwefel bei der Energieerzeugung). Text in German. Chem.- Ing.-Tech., 44(1+2):1-7, 1972. 27 refs.*

Research conducted in the field of oil and coal desulfurization, especially combined with energy generation, is reviewed. Though the sulfur content in oil and coal can be reduced considerably by hydrogenation under high pressure, binding sulfur in a combined gasification and gas-steam turbine plant may be a better solution. Such a system may be developed by the mid-80's. Coal is gasified in fluidized bed by means of air and water vapor under pressure and at high temperature, and the hydrogen sulfide formed is bound by a panel bed filter of partly calcined dolomite which also separates dust at an efficiency above 99%. The over-all efficiency of such an integrated gasifier-gas steam turbine system is calculated to be higher than 50%. Pyrolysis at 700-800 C under high pressure in the presence of hydrogen and calcined dolomite represents another potential method for gasifying fuels and even their combinations.

24191 APTIC NO. 43936

Stephenson, James B., James L. Holman, and James W. Jensen

RESOURCE ASPECTS OF PVC IN URBAN WASTE. *Bureau of Mines, Washington, D. C. and IIT Research Inst., Chicago, Ill., Proc. Miner. Waste Util. Symp., 3rd, Chicago, Ill., 1972, p. 429-437. 21 refs. (March 14-16.)*

In conjunction with its research program on separation, recovery, and recycling of metal, mineral, and energy-based materials in urban refuse, the Bureau of Mines is developing means to reuse and recycle plastics discarded in raw municipal waste. Experimental work on plastic waste from a community collection has produced some guidelines for systematic methods of processing, including air classification, cleaning, and separation into types. The polyvinyl chloride fraction, as well as the other plastic fractions, can be refabricated. Incineration is a practical means of disposal for those plastics that do not contain chlorine. Thermal decomposition of polyvinyl chloride has yielded four products: hydrochloric acid, char, liquid condensate, and a combustible off-gas. The hydrochloric acid can be utilized in chemical processing and the other three products could be used as fuel, with heat contents of 12,000-20,000 Btu/lb. Future research is also indicated. (Author abstract modified)

24192 APTIC NO. 43838

Suloway, Marshall

THE NORTHWEST INCINERATOR. THE NEWEST STEP TOWARD WINNING THE URBAN REFUSE RACE. *Bureau of Mines, Washington, D. C., and IIT Research Inst., Chicago, Ill., Proc. Miner. Waste Util. Symp., 3rd, Chicago, Ill., 1972, p. 337-364. (March 14-16.)*

The refuse collection and disposal program of the City of Chicago, including the new Northwest Incinerator, is described. The incinerator enables Chicago to incinerate 100% of its present annual collection of 1.3 million tons of domestic refuse. The burn-out efficiency of the new facility is greater than 93%. The plant is equipped with electrostatic precipitators which keep stack emissions well below the air-pollution code requirement of 0.2 grains/cu ft of dry particulate at 12% carbon dioxide. Objectionable odors are prevented from leaving the incinerator by maintaining negative air pressures. Chicago has initiated studies to anticipate the rate of growth, future requirements, and all available alternatives for solving disposal problems.

24193 APTIC NO. 43843

Sundberg, Ove

HOW PRESS PUBLICITY MAKES INDUSTRIES SOLVE THEIR POLLUTION PROBLEMS. (Resultater for avisforsiderne). Text in Danish. Dansk Ind., no. 6:16-18, June 1972.

Pollution problems as solved by a few industrial plants in Denmark are reviewed. Technological improvements at a superphosphate plant resulted in both decreased production costs and abated pollution. A new fish processing plant will be erected outside a town to avoid nuisances to residents. An electrostatic dust separator with a capacity of 13,000 cu m/min was installed at a cement manufacturing plant. It now has an efficiency of 99.5% which can be further increased to 99.9%. Though the fuel oil used contains 2-3% of sulfer, the bulk is bound in the form of sulfates with some 0.3% forming sulfur dioxide as a result. Systematic dust sedimentation measurements around the plant are carried out. Large areas around the plant have been purchased for forestation and to prevent them from becoming residential areas.

24194 APTIC NO. 43881

Suzuki, Shigeto, Karl H. Kilgren, and Giok H. Tjoa

METHOD OF REMOVING HYDROGEN SULFIDE FROM GASEOUS MIXTURES. *(Chevron Research Co., San Francisco, Calif.) U. S. Pat. 3,642,431. 7p., Feb. 15, 1972. 3 refs. (Appl. Sept. 19, 1969, 9 claims).*

Hydrogen sulfide and similar sulfides can be selectively removed by contacting the fluid in which they are contained with a substantially hydroxyl-free solvent, such as N-methyl-2-pyrrolidone, a dicarboxylic acid anhydride soluble in the solvent, and an alkali hydrosulfide. Preferable, an admixture of H2S and carbon dioxide in natural gas is mixed with the contacting solution to react the H2S with the anhydride; the CO2 and/or hydrocarbons are rejected from the contacting solution by mild heating and/or pressure reduction. Thereafter, H2S is regenerated by heating the remaining solution. While many processes are available for the removal of acidic constituents from gas streams, they involve a number of disadvantages. The neutralization processes are essentially nonselective for H2S or CO2, while the oxidation processes involve plugging problems, additional techniques and equipment, and often use potentially toxic oxidizing agents. The physical solution process and the physical permeation/adsorption processes may show some selectivity for H2S relative to CO2, but the relative preference for H2S is generally limited to several fold rather than one or more orders of magnitude. Furthermore, the actual amount of CO2 removed from the treated gas stream can be substantially larger than the quantity of H2S removed. (Author abstract modified)

24195 APTIC NO. 43949

Suzuki, Shigeru

MOMENTUM SEPARATION FILTER. *(Kansei bunrikei firuta). Text in Japanese. (Hitachi Manufacturing Co. (Japan)) Japan. Pat. Sho 47-9403. 2p., April 10, 1972. (Appl. Jan. 23, 1970, 1 claim).*

This device relates to the improvement of a momentum separation filter in which dusts are removed with collecting ducts due to the momentum. V-type louvers with dust collecting ducts on one side are horizontally equipped in the filter. A separating plate is placed between two louvers to prevent the turbulent flow caused by the collision of two streams of air from two adjacent louvers. This increases the efficiency of the filter. While clean air is separated and passes through the louver, dust and impurities with momenta hit the louvers and move forward to the dust collecting ducts from which they are removed.

24196 APTIC NO. 43835

Szozypinski, Zbigniew, Antoni Gajewski, and Jan Zygadlo

LIQUIDATION OF EXIT NITROGEN OXIDES BY ABSORPTION IN NITRIC ACID SOLUTIONS WITH ADDITION OF UREA. *(Likwidacja wylotowych tlenkow azotu przez absorpcje w roztworach kwasu azotowego z dodatkiem mocznika). Text in Polish. Przemysl Chemi., 51(3):156-159, 1972. 7 refs.*

This paper deals with preliminary tests that were carried out to determine the optimal method for rendering harmless the residuals of nitrogen oxides in exit gases resulting from nitric acid production. The method tested was based on absorption in nitric solutions. The effects of adding urea to the solution were one of the main objects of the investigation. The following aspects of the tests are emphasized: concentration of the nitric acid, time of contact between the gas and the liquid, and the proportion of urea to be used in the process. The results of the tests generally tended to support the validity of the adopted methodology and, therefore, were adjudged as encouraging.

24197 APTIC NO. 43884

Tadokoro, Tomoo, Motoyuki Hayashida, and Shigetake Yoshimura

EXHAUST GAS PURIFICATION SYSTEM FOR INTERNAL COMBUSTION ENGINE. *(Toyo Kogyo Co. Ltd., Hiroshima (Japan)) U. S. Pat. 3,657,893. 4p., April 25, 1972. 4 refs. (Appl. Feb. 27, 1970, 10 claims).*

An exhaust gas purification system is presented for oxidizing and eliminating the unburned noxious contents of internal combustion engine exhaust gas by supplying secondary air into the exhaust gas. The system comprises an air pump adapted to be driven by the engine, an exhaust passage, a conduit connecting the pump to the passage, and a control valve in the conduit. The valve body has an inlet port connected on the air pump side and an outlet port on the exhaust passage side. The exhaust gas purification system can automatically control the supply of secondary air to the exhaust passage according to various conditions of the engine, such as revolution speed, acceleration or deceleration, and extent of load.

24198 APTIC NO. 44181

Takahashi, Satoru

INTERNAL COMBUSTION ENGINE EXHAUST TREATMENT DEVICE. *(Nainen kikan no haiki shori sochi). Text in Japanese. (Suzuki Automotive Industries (Japan)) Japan. Pat. Sho 47-8843. 3p., March 14, 1972. (Appl. Oct. 14, 1966, 1 claim).*

An improved apparatus for the purification of exhaust gas from an internal combustion engine by oxidation is discussed. The exhaust pipe is inserted concentrically into a cylindrical catalytic reactor covered with heat insulating materials. Small holes are bored at the end of the pipe, which is covered with a wrapper which also has a number of small holes. Catalysts of platinum supported by alumina are packed in the reactor, and the reaction temperature is kept at 800 to 1100 C. Heat exchange is carried out between the discharging clean air and the incoming exhaust gas through the exhaust pipe not covered by the catalytic layer.

24199 APTIC NO. 43805

Tamura, Zensuke

ON DRY TYPE EMISSION GAS DESULFURIZATION PROCESS USING ACTIVATED CARBON. *(Kasseitan haigasu kanshiki datsuryu ho ni tsuite). Text in Japanese. Denki Kyokai Zasshi (J. Japan Elec. Assoc.), no. 582: 27-31, April 1972.*

The activated carbon gas desulfurization process, whose large-scale pilot plant experiment has been completed and which has reached the stage of practical industrial application, is described. In the process, pelletized activated carbon made of coal is used. Each pellet has a countless number of small pores ranging from Angstrom- to micron-size, the total internal surface area measuring 600-1000 cu m/g. Tested at temperature of 100 C, it does not adsorb nitrogen or carbon dioxide, but does adsorb sulfur dioxide and water. The adsorption of SO_2 or H_2O reaches saturation in a short period of time if the SO_2 or H_2O exists by itself. When SO_2 exists together with H_2O or oxygen the adsorption increases with time. In such a case, chemical adsorption caused by the catalyst effect of the carbon occurs in addition to physical adsorption, thus greatly increasing the adsorption capacity. Sulfur dioxide in the boiler flue gas is adsorbed by the activated carbon as follows: SO_2, H_2O and O_2 are first adsorbed, the SO_2 on the surface of the carbon is oxidized to sulfur trioxide; sulfuric acid is formed through a hydration reaction; and the H_2SO_4 is diluted with excess H_2O. It is finally adsorbed in the form of dilute H_2SO_4. According to the flow sheet of the activated carbon adsorption process, the boiler gas is pressurized and then divided into two flows, one led to the concentration tower to be cooled and later joining the other flow. The gas, so adjusted in temperature as to be suitable for the adsorption by the activated carbon, goes into the activated carbon packed tower, where the desulfurization/cleaning of the gas is performed. Each of the packed towers is washed with water for regeneration after 10 hr of continuous use.

24200 APTIC NO. 44258

Tanaka, Eichi

TECHNIQUES FOR DUST PREVENTION IN STEEL INDUSTRY. *(Tekkogyo ni okeru funjin boshi gijutsu). Text in Japanese.* Netsu Kanri to Kogai *(Heat Management Public Nuisance), 24(8):34-39, Aug. 1972.*

Dust prevention at different locations in a steel manufacturing factory is described. Water is sprayed on ores to reduce dust during loading and unloading of the materials. Formation of a water film over the hopper of the unloader by spraying water is also effective. In this case, water with a pressure higher than 1.5 kg/sq cm is required. The same method is used for the control of dust on a conveyor. Water with a lower pressure at about 2 kg/sq cm is usually satisfactory for this purpose. The dust formation from a furnace while coke is being supplied can be prevented either by decreasing the pressure in the furnace or by collecting the dust through the duct by suction. A suction system including a hood is usually placed on the coke guide for the dust collection.

24201 APTIC NO. 43799

Tanaka Kusuyala

METHOD FOR DEVELOPMENT OF STACK GAS DESULFURIZATION DEVICES. *(Haien detsuryu sochi kaihatsu no hoho). Text in Japanese.* Kemikaru Enginiyaringu *(Chem. Eng.), 17(5):481-484, May 1972.*

The representative stack gas desulfurization processes known 10 years ago were the alkalized alumina method, wet type limestone method, and activated carbon method. The practicability of a dry type limestone method was studied. The results obtained by the preliminary experiment in which limestone was blown into the test furnace seemed to show the method promising. Based on the findings from this experiment, a dry type stack gas desulfurization device was designed to meet the following requirements: the gas-limestone contact should be performed within 2 sec; the temperature of all the reaction towers should be uniform and controllable; the composition of the gas can be changed freely; the gas flow should be turbulent; calcium oxide or calcium hydroxide should be used as the limestone to be free of calcination effects; the grain size of the limestone should be as uniform as possible; and the limestone should be distributed uniformly in the gas. To make the gas flow turbulent, the Reynolds number was set at 8000 or higher. The following conclusions were obtained from the operation of the device under various conditions: the gas analysis value was identical whether made at a 5 m or 9 m height from the bottom; the reaction time was 1 sec or less and desulfurization efficiency did not increase with a longer reaction time; the desulfurization rate was 35%, even with the use of a theoretical volume of limestone; if calcinated limestone is to be used, the best calcination temperature is 1050 C. The disadvantage of the dry method is that a layer of calcium sulfate forms just inside the pores of the limestone grains. This layer blocks the diffusion of sulfur trioxide into the inner layers of CaO. For this reason, the National Research Institute for Pollution and Resources has reportedly terminated the research on this method. The dry and wet methods in use overseas are also briefly introduced.

24202 APTIC NO. 44180

Tanaka, Yuji

AUTOMOBILE ENGINE EXHAUST GAS TREATMENT APPARATUS. *(Jidosharyo enjin no haiki gasu no shoriki). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 47-10568. 5 p., April 19, 1972. (Appl. March 10, 1965, claims not given).*

An apparatus for the removal of toxic gas and isolated carbon in engine exhaust gas is discussed. Two concentric cylindrical pipes are in the combustion chamber. An inner porous tube, made of thermal-resisting materials such as baked silicate, alumina, quartz, or magnesia which promotes thermal decomposition, is inserted. The gas contact surface of the porous tube is coated with a chelate compound of acetylacetone and metals for use as the catalytic surface. Spark equipment is then fixed through which the mixtures of propane, butane, and air are burned and introduced into a closed metal box, and the harmful gases are burned by the heat generated from the infrared radiation. The isolated carbons are adsorbed and burned by the electrostatic force and the high voltage of the spark equipment.

24203 APTIC NO. 44134

Themelis, N. J., G. C. McKerrow, P. Tarassoff, and G. D. Hallett

THE NORANDA PROCESS. *J. Metals, 24(4):25-32, April 1972. 7 refs. (Presented at the American Institute of Mining, Metallurgical and Petroleum Engineers, The Metallurgical Society, Annual Meeting, 100th, Feb. 26-March 4, 1971.)*

The Noranda Process offers an alternative to conventional reverberatory and converter smelting of copper concentrates. It reduces fuel consumption by making full use of the exothermic heat of the converting reactions in a single furnace. The size of the smelter building and of such auxiliary equipment as waste heat boilers, flues, and Cottrells are reduced. Unlike conventional smelting, the copper content in the slag is not geared to the concentrate grade. Slag of variable composition can be successfully treated by milling, to produce a high grade copper concentrate which is recycled, and a low copper tailing which is discarded. Of particular importance is the fact that the process generates a continuous flow of high strength sulfur dioxide gas which is suitable for the manufacture of sulfuric acid. The technical feasibility of the Noranda process was established in a large scale pilot plant. The process is described, including operation of the pilot plant, development work, results, and scale-up to an industrial plant. (Author conclusions modified)

24204 APTIC NO. 44641

Theodore, Louis

APPLICATION OF MODELING AND SIMULATION TECHNIQUES TO THE DESIGN OF VENTURI SCRUBBERS. I. MODEL OF PARTICLE CAPTURE. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 25p., 1972. 15 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 65th, Miami, Fla., June 18-22, 1972, Paper 72-101.)*

A study was made to develop a satisfactory mathematical model for venturi scrubbers to describe particle collection efficiency as a function of power consumption; and to develop improved design procedures, especially for particle capture. The mechanics of solid capture by the liquid phase is of major importance in predicting the performance of a venturi scrubber. A prerequisite of a model of particle capture is a description of the flow field in the vicinity of the liquid droplet. However, the flow is so complex in this system that it can only realistically be represented by a simplified model. One of the simpiest is the free surface or cellular model originally proposed by Happel. This idealized cellular model is assumed to consist of two concentric spheres, the outer sphere representing a fluid envelope having a free surface and containing the aerosol, and the inner sphere containing the droplet. This model can be utilized to predict particle capture. This is accomplished by computing the trajectory of an aerosol particle as the fluid flows around the inner sphere (the liquid collector) in the two-concentric-sphere model. Single particle collection efficiencies for the cellular model are presented for various void fraction values. These are compared with the results for a single collector (unit void volume) in both the creeping motion and potential flow regimes. The results clearly indicate that single particle collection efficiencies are a function of the voild void volume. In addition, theory and experimental results for the single collector in the high Reynolds number range are bounded by the viscous cellular model calculations for void fraction values of 0.66 and 0.90. The extension of the single particle collection efficiency model to include the contribution of the entire assemblage of eligible collector cells is presented. The effect of variations in particle velocity, liquid velocity, and void volume, and particle and liquid size distributions on the overall efficiency equation is discussed. (Author abstract modified)

24205 APTIC NO. 44182

Tsuzuki, Takashige

TWO-CYCLE ENGINE EXHAUST EMISSION CONTROL DEVICE. *(2-saikuru kikan no haikien boshi sochi). Text in Japanese. (Daihatsu Motors (Japan)) Japan. Pat. Sho 47-9143, 3p., April 7, 1972. (Appl. Nov. 11, 1968, 1 claim)*

The device relates to a new apparatus for the control of lubricant in the crankcase of a two-cycle engine. A pipe is extended from the bottom of the crankcase to a pump which is connected to a thermal sensitizer located at a position where the thermal effect of cooling water and exhaust gas are highly sensitive. When the engine is not in operation, the lubricant accumulated at the bottom of the crankcase is sucked by the action of a piston in the pump which is pulled by a rod connected to the thermal sensitizer. When the engine is in operation, the pushing action of the piston prevents the accumulation of lubricant at the bottom of the crankcase. Thus, the smoke formation resulting from the combustion of lubricant in the crankcase is prevented.

24206 APTIC NO. 44283

Turner, T. Henry

CLEAN AIR TUNNELS. *Clean Air, 1(5):4-6, Spring 1972.*

The English Channel Tunnel will link the European continent with the United Kingdom. Responsibility for planning the English Channel Tunnel is shared by both the British and French governments and the contractors involved. The problems to be solved will be complex, the most essential one being providing clean air. Engine fumes could be reduced by transporting all road vehicles on special electrically hauled railway flat cars. Ventilation of steam railway tunnels is very complicated. Natural ventilation may give an upward draft in winter and a downward draft in summer. Either may be completely upset by normal changes in wind speeds and directions. If road vehicles use their own engines in the tunnel, carbon dioxide, carbon monoxide, lead, nitrogen oxides, asbestos debris from brake shoes, and rubber debris from tires will need consideration in the confined conditions of the tunnel. Much research has been conducted, and its results will be very helpful when planning the English Channel Tunnel. The following hazards must be taken into consideration when building a tunnel: dust and fire risks coming from porous noise-absorbing materials used for lining; noise which builds up in confined spaces by echoing; odors of nitrogen oxides produced by electrical sparking; fire risks from any fixed or mobile sources; humidity, which, when excessive, will shorten the useful life of electrical components; and temperature variations, which should be avoided as much as possible for the sake of passengers and maintenance staff. The salt from the sea air will greatly increase corrosion of essential components. The possibility of using steam engines should be completely excluded because of noxious emissions and the danger of not seeing an approaching engine in the dense fog generated.

24207 APTIC NO. 44307

Usui, K.

PROBLEMS OF DUST COLLECTION AT FOUNDRIES AND COUNTERMEASURES. *(Imono kojo ni okeru shujin mondai to sono taikaku). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air cleaning Assoc., Tokyo), 110(3):11-14, Aug. 1972.*

A general discussion is given on dust collection at foundries, including problems and control policies. The dust from foundries consists mainly of silicon dioxide, and the distribution of the particle size is large. At the sand adjustment line, the suction duct is very often clogged by the wet sand, and special attention is needed. Since the dust standard has been largely revised from 2g/N cu m to 0.4 or 0.2 g/N cu m, a simple water spray type dust collector, which has long been used particularly for cupola furnace, is not sufficient. Flue gas from a 5 ton/hr cupola furnace usually contains 3 to 16 g/N cu m of particulate, and to reach the 0.2 g/N cu m standard, a venturi scrubber with a pressure loss of about 1000 mm Hg is required.

24208 APTIC NO. 44093

Varfolomeyev, D. F., F. Kh. Urazayev, F. G. Akhmetov, M. N. Stekol shchikov, and E. G. Butakov

HYDROFINING OF LIGHT GAS OIL FROM CATALYTIC CRACKING FROM VACUUM GAS OIL FROM HIGH-SULFUR PETROLEUMS. *(Gidroochistka legkogo gazoylya kataliti cheskogo krekinga iz vokuemnogo gazoylya vysokosernistykh neftey). Text in Russian. Neftepererab. Neftekhim., no. 6:5-7, 1972.*

Gas oil was hydrofined on regenerated cobalt-molybdenum-aluminum oxide catalyst at space velocity 1.4-1.6/hr, 350-90 deg, and 28-30 atm with 200-350 vol/vol circulating gas containing more than or equal to 80% hydrogen to decrease sulfur from 2.4 to 0.13 wt % and nitrogen from 0.017 to 0.006 wt %. Gasoline having 60-7 octane number and a high content of naphthenic and aromatic hydrocarbons was also obtained. The H consumption was 0.67 wt % for both hydrofining and secondary reactions. The catalyst had high efficiency even after twofold regeneration.

24209 APTIC NO. 43723

Vincent, James H.

NOTE ON THE GRID-TYPE ELECTROSTATIC PRECIPITATOR. *J. Air Pollution Control Assoc., 22(3):200-201, March 1972. 4 refs.*

The grid-type electrostatic precipitator evolved from some basic research into the collection of airborne charged dust particles in the wake of a flat, metallic, perforated plate under the action of an externally applied electric field. Dust particles are trapped in the vortices formed in the wakes of the solid portions of the first perforated plate, and are swept from there to the downstream surface of the grid by the action of the externally applied electrostatic field. This mechanism is called vortex-enhanced electrostatic precipitation. Experimentally measured data have demonstrated that vortex-enhanced electrostatic precipitation is the most powerful contributing collection mechanism, outweighing straightforward back repulsion by an order of magnitude. Collection efficiency is dependent on electric field, gas velocity, grid solidity, particle size distribution, and particle charge. The grid-type electrostatic precipitator thus evolved into a device consisting of a number of flat perforated metallic plates placed parallel to one another, equidistant, and perpendicular to the gas flow. A single stage is defined so as to consist of a grounded grid, followed by a high voltage grid, followed by another grounded grid. In a 2-stage device, the third grid of the first stage becomes the first grid of the second stage, giving the device a total of five grids. An n-stage device therefore consists of 2n plus 1 grids. Multistage grid-type electrostatic precipitators have been successfully tested in the laboratory and in the field. They are highly effective for removing a large proportion of the dust which escapes collection in a preceding conventional precipitator, thus substantially upgrading the overall performance of the total installation for the control of particulate emissions.

24210 APTIC NO. 44119

Voorhoeve, R. J. H., J. P. Remeika, P. E. Freeland, and B. T. Matthias

RARE-EARTH OXIDES OF MANGANESE AND COBALT RIVAL PLATINUM FOR THE TREATMENT OF CARBON MONOXIDE IN AUTO EXHAUST. *Science, 177(4046):353-354, July 28, 1972. 3 refs.*

The perovskite-like compounds RE(1-x)Pb(x)MnO3 and RECoO3, where RE (rare earth) is lanthanum, praseodymium, or neodymium, are active catalysts for the oxidation of carbon monoxide. Crushed single crystals of these compounds compare favorably with commercial platinum catalysts in initial activity and lifetime. Therefore, these compounds are promising substitutes for platinum in devices for the catalytic treatment of auto exhausts.

24211 APTIC NO. 44343

Waki, Koichi

ALUMINUM REFINERIES. *(Aruminyumu seirenjo). Text in Japanese. (Kinzoku Zairyo (Metals in Engineering), 12(5):45-51, May 1972. 19 refs.*

Pollution at aluminum refineries and its control is discussed. The major material for the production of aluminum by the electrolytic method is cryolite to which aluminum trifluoride is usually added to increase the current efficiency, decrease the melting point, and protect the electrolyzer. The addition results in the formation of sodium aluminum tetrafluoride, which is volatile and reacts readily with water vapor to form hydrogen fluoride. The amount of fluoride discharged depends largely on the residue hydrocarbon on the anode, the alumina in electrolyzer, and the temperature and bath ratio. A combination of dust collector, such as a cyclone or an electrostatic precipitator, for the removel of particulates, and a washing tower for the removal of HF gas is used for the purification of flue gas from Al refineries.

24212 APTIC NO. 43865

Watanabe, Tadashi

STACK GAS SCRUBBER DUST COLLECTION DEVICE. *(Senen shujin sochi). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 47-9421. 2p., April 10, 1972. (Appl. Feb. 13, 1970, 1 claim).*

This device relates to the improvement of a stack gas scrubber for dust collection before it is discharged from the stack. A conical tank with opened ends is equipped in a larger tank which has a gas outlet duct at the top and a particulate discharge pipe at the bottom. The gas inlet duct is connected to the top of the conical tank where two semi-circle sprinklers are equipped on the wall. A third sprinkler is equipped at the middle of the outer tank. When gas is introduced from the gas inlet duct into the conical tank, a turbulent flow occurs due to the change in diameter. The particulates in the flue gas are effectively washed out by the two sprinklers. The resulting gas emerges from the inner tank at a faster velocity due to the conical shape and is again washed by the third sprinkler. Clean gas is released from the gas outlet duct, while dust-containing water is collected at the bottom of the outer tank.

24213 APTIC NO. 43886

Wilson, Raymond F., Reese A. Peck, and Frank E. Guptill, Jr.

PRODUCTION OF LOW SULFUR FUEL OIL. *(Texaco, Inc., New York, N. Y.) U. S. Pat. 3,658,681. 5p., April 25, 1972. 5 refs. (Appl. Feb. 24, 1970, 8 claims).*

Low sulfur fuel oil can be prepared by distilling an asphalt-containing petroleum fraction to obtain a vacuum gas oil and vacuum residuum. The vacuum gas oil is passed downward with hydrogen through an upper bed of desulfurization catalyst; the residuum fraction is passed upward through one or more lower beds of desulfurization catalyst, and the desulfurized effluents are combined. It is advantageous to pass the distilled fraction down through the desulfurization zone with less residence time and the residual fraction up through the desulfurization zone to subject it to more back-mixing and turbulence, thereby effecting a longer residence time. According to this process, large volumes of low sulfur fuel oil can be produced when the demand is greater, and smaller volumes can be produced when the demand is lower. Similarly, the process can be adapted to supply larger volumes of feedstock for catalytic cracking units when the demand for gasoline is greater. (Author abstract modified)

24214 APTIC NO. 43888

Winsor, John and John Carruthers

DESULPHURISATION AND DE-AROMATISATION OF PETROLEUM DISTILLATES. *(Assignee not given.) U. S. Pat. 3,654,139. 5p., April 4, 1972. 10 refs. (Appl. July 5, 1968, 14 claims).*

A process is disclosed in which a 60-250 C distillate, containing up to 2% by weight of sulfur and up to 25% by weight of aromatics, is catalytically desulfurized with hydrogen in a first stage to convert the major proportion of the sulfur to hydrogen sulfide. Hydrogen sulfide is removed. The fraction with reduced sulfur content is contacted with supported elemental nickel to remove the remaining sulfur in a second stage without liberation of H2S, without aromatics hydrogenation, and without hydrocracking. The desulfurized fraction is hydrogenated over supported elemental nickel in a third stage. Since the poisoning effect of sulfur on nickel is cumulative, even small amounts of sulfur of the order of a few ppm in a feedstock are harmful. The present process overcomes this disadvantage by using several stages. (Author abstract modified)

24215 APTIC NO. 44148

Xeller, H

MULTI-STAGE COOLER WITH INTERMEDIATE SIZE REDUCTION. *(Stufenkuehler mit Zwischenzerkleinerung). Text in German. Zement-Kalk-Gips (Wiesbaden), 25(6):283-285, June 1972.*

In the conventional cooler, the cement clinker undergoes different cooling rates in its different particle size fractions. A more favorable and uniform cooling effect is attainable by reducing the size of the coarse particles, not at the outlet of the cooler, but at an earlier stage, so as to increase the surface area of the clinker and thus obtain more effective aftercooling. This result can be achieved by means of a multi-stage cooler with intermediate size reduction. A cooler of this kind comprises three grates, each with its own drive mechanism. The first grate constitutes the recuperation zone, pre-cooling is effected on the second, and after-cooling on the third grate. A single-spindle hammer crusher is installed between the second and the third grate. To take full advantage of this intermediate crushing, with regard to exhaust air utilization, the cooler operates in duotherm circuit. Comparison with a conventional grate cooler reveals the more intensive cooling and better use of the clinker heat achieved by the multi-stage cooler with intermediate size reduction. Because of the difficulty of suitably removing the dust from the exhaust air, however, the cooler is recommended only in cases where complete exhaust air utilization is possible, and importance is attached to obtaining low final clinker temperatures. (Author summary modified)

24216 APTIC NO. 44206

Yamaki, Naoomi

PUBLIC NUISANCE - SAFETY. *(Kogai anzen). Text in Japanese. Nenryo Kyokaishi (J. Fuel Soc. Japan, Tokyo), 51(543):587-595, July 1972. 194 refs.*

A general discussion is given on the measurement of air pollutants and control methods for sulfur oxides and automotive exhausts. A new device using the relative spectra of sulfur dioxide and nitrogen dioxide, and many other methods for the measurement of sulfuric acid mist, has been developed. The Saltzman method is the most widely applied for NO2 detection, but, in recent years, ultraviolet absorption and chemiluminescent methods have been drawing more and more attention. Strict regulations for SO2 control are enforced, so that many efforts have been made to improve flue gas desulfurization and hydrodesulfurization of heavy oil. An effective method for automotive exhaust control using an exhaust reactor has been systematically studied. Control by improving fuel quality is also mentioned.

24217 APTIC NO. 44338

Yatunami, K. and K. Hirai

THE PROBLEM AND EQUIPMENT OF DUST COLLECTION IN IRON MAKING PLANT. *(Seisen kojo ni okeru shujin mondai to sono taisaku). Text in Japanese. Kuki seijo (Clean Air - Japan Air Cleaning Assoc., Tokyo), 10(3):15-22, Aug. 1972. 4 refs.*

A general discussion is given on dust collection in an iron manufacturing plant. Dust collection is usually achieved by means of four processes, namely, material pre-treatment process, coke manufacturing process, sintering process, and blast furnace process. Since the dust concentration is as high as 20 g/N cu m to 30 g/N cu m at coke loading, preliminary washing of the gas before it is introduced into the dust collector is required. The dust content is about 0.5 g/N cu m to 2 g/N cu m at the main draft of the sintering process. An electrostatic precipitator has been used for the dust collection and the efficiency is high. Double dust collection is applied for the removal of dust in the flue gas from the blast furnace. This consists of a gravity dust collector and a combination of a venturi scrubber and electrostatic precipitator. The water consumption of the secondary dust collection process is about 1000 to 1500 tons/hr/blast furnace.

24218 APTIC NO. 44302

Yoshihara, T. and T. Osugi

ELECTROSTATIC PRECIPITATOR FOR CUPOLA. *(Kyupora-yo denki shujinki). Text in Japanese. Kuki Seijo (Clean Air J. Japan Air Cleaning Assoc., Tokyo), 10(3):50-55, Aug. 1972. 6 refs.*

The flue gases from a cupola furnace and the selection of dust collecting equipment for their purification are described. The flue gas usually contains 6 to 12 g/n cu m or an average of 10 g/n cu m of dust, which consists of ferrous oxide, ferric oxide, manganese oxide, calcium oxide, and alumina. There are three major distributions of the particle size, 2 to 5 micron, 20 to 50 micron and 100 to 500 micron. For better collection, an electrostatic precipitator is selected. It is found that at wind speeds in the precipitator higher than 10 m/sec, the collection efficiency decreases remarkably, and the higher the collection temperature, the lower is the collection efficiency. It is also shown that wet type collection has an efficiency as high as 99%. However, the problem of waste water treatment remains.

24219 APTIC NO. 44111

Yoshimochi, S.

CONTROL TECHNIQUES FOR NITROGEN OXIDE EMISSIONS. *(Chisso sankabutsu no haishutsu to taisaku ni tsuite). Text in Japanese. Sekiyu Gakkai-Shi (J. Japan Petroleum Inst., Tokyo), 15(7):558-563, July 1972. 20 refs.*

The mechanism of nitrogen oxides generation in combustion systems is discussed together with various NOx measuring methods including those specified in JIS K-0104 and their problems, NOx reduction measures applicable to combustion devices, and various processes for removing NOx from combustion gases. The Naphthylethylenediamine method tends to indicate smaller values than the actual in the range of 200 ppm or lower and larger values than the actual in the range higher than 200 ppm. When oxygen is used instead of air as the oxidating agent, the method gives an almost constant value of nitrogen dioxide/nitric oxide, including the gas-phase oxidation rate, irrespective of NO concentration. The value is larger than that indicated in the case of air. With the phenoldisulfone method (JIS Method 2), care should be taken to eliminate the influence of sulfur dioxide present in the emission gas by increasing the amount of hydrogen peroxide solution. This method tends to underestimate for NOx values when concentrations are low, but provides satisfactory reproducibility if the JIS procedures are observed. The oxidation reduction potentiometric method is widely used for monitoring NOx. In this method, purity, especially the NOx content, of the standard NO gas used for span adjustment of the NOx monitor and the concentration ratio of NO/NO2 of the sample gas greatly affect the analyzed value, since the membrane in the electrolytic cell that is the probe terminal of the NOx monitor gives different selectivity according to the material it is made of. Methods recommended to reduce NOx emissions from large boilers are tangential firing, over fire air, induction of recycling gas, and adjustment of operating conditions including low excess air, and increased amounts of recycling gas. Denitration processes for emission gases are tabulated.

24220 APTIC NO. 43804

Yoshimura, Yoshito

WELLMAN-LORD TYPE STACK GAS DESULFURIZATION PROCESS. *(Uerunan roodo-ho haien datsuryu purosesu). Text in Japanese. Kemikaru Enginiyaringu (Chem. Eng.), 17(5):485-490, May 1972. 4 refs.*

A Wellman-Lord process stack gas desulfurization plant, newly designed and installed in the Chiba Plant of the Japan Synthetic Rubber Co., has been continuously operating for 8 mon. The main specifications and the 8-mon operating performance of the plant are reported. Designed to take care of the stack gas emitted from two boilers of 130 tons/hr capacity, consuming 120,000 kl of 4%-sulfur heavy oil fuel annually, the plant can dispose of 200,000 cuNm/hr gas. The sulfur dioxide concentration is 2000 ppm at the entrance and 200 ppm at the exit; the stack gas temperature is 160 C and 60 C, respectively. The desulfurization rate is 90-95%. Sulfuric acid production is 40 tons/day, with a purity of 98%. The construction cost is approximately $2 million and the plant site is 1500 sq m. The absorption towers, recovery device of absorbent liquid, effluent disposal devices, control measures for white smoke, SO2 meters to assure constant desulfurization rate, and emergency measures are discussed. This desulfurization plant was tested for its performance with 2%-S, 3.5%-S and 4.2%-S heavy oil fuels. It gave a desulfurization rate of 90% or more for any of these three fuel types. Recovery of sulfuric acid presently amounts to about 10-15 tons/day, the concentration of the acid being 98.2-98.5%, satisfying the JIS-K 1302 standard. An assessment of the process is briefly made from the viewpoint of total economy. Also described are the basic mechanisms of the process and its advantages.

24221 APTIC NO. 44309

Yoshitomi, Suehiko and Miyoko Kashiyae

THE CONVERSION CATALYSTS OF AUTOMOTIVE EXHAUST GAS. *(Jidosha haiki gasu no jyoka shyokubai). Text in Japanese. Nenryo Kyokaishi (J. Fuel Soc. Japan, Tokyo), 51(541):274-280, May 1972. 26 refs.*

The catalytic conversion of automotive exhaust gas into less harmful substances is an important problem from the view point of the cleansing of air pollutants. However, the cleaning of the automotive exhaust gas, especially conversion of nitrogen oxides into harmless gases, is very difficult. The important characteristics of the catalysts are high activation, heat-resistance, endurance, harmlessness, and low cost. The waste gases from various engines, i.e., diesel, gasoline, and propane, consist of carbon monoxide, hydrocarbons, nitrogen oxides, and formaldehyde. The perfect oxidation catalysts for CO and the activation of various catalysts for the CO-02 reaction were discussed. The relation between the inversion rate and the reaction temperature for oxidized metals was shown in a graph. The perfect oxidation catalysts for hydrocarbons such as methane, C3H6, and i-C4H8 were discussed. The relation between the inversion rate and temperature for the hydrocarbon reaction was discussed and shown in a graph. The structure and mechanism of catalysts for CO and hydrocarbons were discussed with respect to the nickel oxide-manganic oxide system, the iron oxide-Mn203 system, the copper oxide-magnesium oxide-alumina system and the CuO-Cr203-Al203 system. The structure of the oxidation reaction and the reaction process were illustrated with chemical formulas. To remove nitrogen oxides there are two methods; direct decomposition and/or reduction. For the decomposition of nitric oxide, Co204 and CuO-Si02 are effective. For the decomposition of nitrogen dioxide, Cu0-Al203, Ce02-Al203 are effective. The reduction catalysts for nitrogen oxides were discussed with chemical formulas, surveying the research up to date.

24222 APTIC NO. 44304

Yur ev, N. V., V. D. Noskov, F. V. Komarov, and I. P. Polunin

PURIFICATION OF INDUSTRIAL GASES CONTAINING A LARGE AMOUNT OF ARSENIC. *(Ochistka tekhologicheskikh gozov s nysokim soderzhaniyem mysh yaka). Text in Russian. Tsvetn. Metal., 45(2):26-30, 1972. 1 ref.*

The purification of roaster gas containing approximately 5 g/cu m arsenic was studied using a dry Cottrell precipitator, a packed scrubber, and a wet Cottrell precipitator, all in a series. The scrubber solution was used to wash the precipitators, and sent periodically to precipitate the arsenic trioxide with calcium hydroxide. The design and performance of the packed scrubber, a turbulent high-velocity venturi scrubber, and the Cottrell precipitator are described. A packed scrubber followed by a wet Cottrell precipitator gave high purification efficiency. The turbulent scrubber was less efficient than the Cottrell precipitator, but was useful at high loading of insoluble dust, when a high degree of purification was not required, and where the gas volume was small.

24223 APTIC NO. 44166

Yurov, V. V., L. M. Rabinovich, and D. K. Tolopko

PHASE EQUILIBRIA IN THE VAPOR/AQUEOUS ACETALDEHYDE SYSTEM. *(Fazovoye ravnovesiye v sisteme par-vodnyy rastvor atsetal degida). Text in Russian. Neftepererab. Neftekhim., no. 2:46-48, 1972. 4 refs.*

The equilibrium concentrations of acetaldehyde in the gas phase during the passage of nitrogen through aqueous solutions at 10 20 C containing 1.0-38.0 g/l of acetaldehyde were 0.33-58.10 mg/l, compared with 10-15 mg/l of aldehydes in the off-gases from a synthetic fatty acid plant. The minimum amount of absorbent required/cu m of gas to remove the acetaldehyde from the off-gases is indicated by the ratio of the acetaldehyde concentration in the gas(mg/l) to its concentration in the solution (g/l), multiplied by 1000. Increasing the solution temperature by 10 C reduces the acetaldehyde solubility by about 50%.

MEASUREMENT METHODS

24224 APTIC NO. 43711

ASTM STUDY WILL EVALUATE STACK-EMISSION TEST METHODS. *Chem. Eng., 79(9):30,32, May 1, 1972. 1 ref.*

Industrial testing teams are moving into final preparations for a carefully coordinated stack-emissions-testing project. The objective is to find out how precisely measurements can be made of particulate matter, collected residue, stack-gas velocity, total oxides of sulfur and nitrogen, and opacity. The results will be of importance to engineers who must design and guarantee process plants and gas-cleaning systems to meet pollution standards. Slated to begin in July 1972 and to take about six months, the program is Phase Two of ASTM s Project Threshold which will focus on the performance of the test method. Four of the pollutants specified, particulate matter, velocity, nitrogen oxides, and sulfur oxides, will be tested by methods not very different from those specified by EPA, so that the Phase Two evaluations will help substantiate EPA regulations. The Phase Two project highlights the need for adequate working space and facilities at sampling points high up to the side of tall stacks. The space needs required will involve a 3-ft wide walkway around a stack some 20 ft in diameter, and facility needs will include apparatus probes, chart recorders, and vacuum pumps. This working-room requirement is already affecting new stack designs.

24225 APTIC NO. 43742

SPECTROMETER MEASURES SO2 IN STACK EMISSIONS. *Chem. Eng., 79(16): 98, July 24, 1972.*

Nearly all the instruments available for analyzing the sulfur dioxide content of flue gases are adaptations of instruments originally intended for out-of-stack use, and nearly all require a sampling system to convey the sample and condition it for analysis. The high reactivity of SO2 makes material loss in such systems inevitable, and steps commonly taken to separate moisture from the SO2 sample generally compound the errors. A correlation spectrometer is described which sidesteps the problem by monitoring the gas in-stack, both qualitatively and quantitatively. The spectrometer uses a slotted probe that extends into the gas stream through a port in the wall of the stack or breeching. Flue gas continuously passes through the slot, as ultraviolet light from a tungsten halogen lamp in the instrument head shines through the flowing sample. A mirror at the far end of the slot reflects the transmitted portion of the ultraviolet light--and thus the flue gas absorption spectrum--back into the spectrometer head. This spectrum is compared electronically with a photograph of the characteristic spectral fingerprint of SO2 absorption.

24226 APTIC NO. 44013

THE MAN, AIR AND WATER EXHIBITION (JUNE 2-8, 1972). *(La Salon l Homme, l air et l eau (2-8 juin 1972)). Text in French. Tech. Sci. Munic., 67(5):227-231, May 1972.*

Measuring instruments developed for air pollution control techniques are reviewed. Portable dust collectors and nephelometers for continous recording of the local visibility as a function of the aerosol concentration were developed. The self recording 0heliphotometer and infrared thermograph for the continuous measurement of the soil surface temperatures and for taking aerial photographs of polluting wastes are described. Coulometric analyzers for sulfur dioxide, nitric oxide, nitrogen dioxide, and oxidants, conductivity analyzers for ammonia and hydrogen sulfide; and automatic chromatographs for reactive hydrocarbons determination have been developed. A comprehensive selective analytical program for air pollution monitoring is elaborated. A colorimeter with logarithmic amplifier and remote control has a measuring range of 0-2.5 ppm. An instrument for total sulfur determination is presented. A chimney, made of polyester or special resin and lined with stainless steel for and aluminum for gas firing, was designed to provide rapid evacuation of the waste gases and to minimize heat losses.

24227 APTIC NO. 44192

CONTINUOUS GAS ANALYSIS AUTOMIZES STEEL PRODUCTION. *(Kontinuierliche Gasanalyse automatisiert Stahlproduktion). Text in German. Technica, 21(14):1289-1290, July 1972.*

A measuring system was developed which continuously determines the volume fractions of hydrogen, oxygen, nitrogen, carbon monoxide, and carbon dioxide in the waste gas of steel production plants. Sampling, preparation, and analysis of the waste gas lasts only 12 sec at the blast furnace; the accuracy is 0.1% by volume. The measurement system comprises a gas sampling probe, the sample preparation equipment, a mass spectrometer, and a digital computer. One or several probes take a gas sample which is preliminarily filtered in a filter following the probe. Through a fine filter, the gas sample goes to a cooler and to a subsequent Peltier cooler where the moisture content is reduced to a residual moisture whose dew point is around +2 C. The prepared sample then goes to a 180 deg sector mass spectrometer for analysis. The digital computer continuously checks the accuracy of the results and monitors the gas flow, pressure, dust load of the filter, calibration gas supply, and temperature.

24228 APTIC NO. 44224

FIRST EXTENSIVE AIR POLLUTION CONTROL SYSTEM OF THE WORLD. *(Erstes umfassendes Luftverunreinigungs-Kontrollsystem der Welt). Text in German. Arch. Tech. Messen, 436(5):R75-R76, May 1972.*

A country-wide air pollution monitoring network planned for the Netherlands is described. Continuous measurements of sulfur dioxide, nitric oxide, nitrogen dioxide, oxygen, and carbon monoxide will be carried out by a total of 250 stations spaced at 28 kms each. The measurement data will be transmitted via telephone lines to a computer center for evaluation. Continuous, fully automated SO2 concentration measurements have been conducted in the Rotterdam industrial area since 1969.

24229 APTIC NO. 44285

ENVIRONMENTAL MONITORING GOES AUTOMATIC. *Mod. Power Eng., 66(6):62-63, June 1972.*

Automatic monitoring of air quality on municipal and national levels and its advantages for predicting future pollutant concentration levels are discussed. Modern monitoring systems can provide remote, unattended monitoring of air and water quality, gather meteorological data, and give alarms or immediate on-line transmission of data to a central point to allow prompt corrective action to be taken. A typical installation monitors meteorological data. Automatic sampling and monitoring instruments are available for parameters concerning typical air quality measurements including: sulfur dioxide, nitrogen oxides, particulate matter, hydrocarbons, chlorine, fluoride, ozone, and mercury. The city of Toronto, Canada is duplicated in a mathematical model used by the air quality branch of Environment Ontario to demonstrate and predict the relationships between various air quality factors in the city. There is also the nucleus of a central environmental monitoring system operating on a national basis. The national air quality surveillance system brings together data collected form air monitoring stations across Canada for computer analysis and comparison. Operations of this system are presently limited largely to analysis and reporting of data. If emissions of all plants could be measured on a minute-by-minute basis by the appropriate pollution control authorities, there could be no better protection against uninformed and biased attacks by environmental groups and environment quality control agencies.

24230 APTIC NO. 44303

PARTICLE VOLUME ANALYZER. *(Messanlage zur Partikelvolumen- Analyse). Text in German. Kerntechnik, 14(7):322, July 1972.*

With the particle volume analyzer, grain size distributions of microscopically small particles, e.g., biological cells, crystalline particles of various composition, and dusts can be determined with high speed. The particles suspended in an electrolyte are drawn through a capillary tube equipped with a nozzle. Together with a particle-free electrolyte they pass through the measurement opening. In the two electrolyte chambers before and after the measurement opening, electrodes are accommodated so that at the application of a current the particles passing the measurement opening trigger a current change. These electrical impulses can be used for determination of the particle number and the particle volume.

24231 APTIC NO. 44333

HERE'S WHAT YOU NEED TO SAMPLE STACK PARTICULATES. *Mod. Power Eng., 66(6):58-59, June 1972.*

New developments and technical trends in the sampling of stack particulates to provide better quality stack emissions are discussed. The sampling of stack particulates can pay significant benefits in terms of improving efficiency if used as a periodic check on combustion efficiency, and to monitor the effectiveness of emission control devices. Since particulate emissions are defined in terms of rate or volume, gas temperature, static pressure, and molecular weight must be determined. The first stage in the sampling train is the probe. The gas entering the probe must be moving at exactly the same velocity as the gas flowing past the sampling point. The opinion is expressed that, regardless of the probe used, the results of stack particulate sampling may be more dependent on the personnel and the techniques used. The next step in the stack sampling train are collectors. Designed to remove the particulate matter from the stack sample, the collectors may be cyclones, filters, electrostatic precipitators, thermal precipitators, impactors, or some combination of these. Other components of the conventional particulate sampling train include a sample flowmeter, temperature and pressure measuring instruments, and a vacuum pump to draw the sample through the train. With the increasing emphasis on continuous monitoring, a variety of instruments have been developed to provide continuous, on-line measurement of particulates. These generally use photoelectric principles to measure the amount of particulates by the degree to which they obscure a light beam or by the light reflected by the dust.

24232 APTIC NO. 44375

MEASUREMENT AND MONITORING OF AIR AND WATER POLLUTION. *(Meting en controle van lucht- en waterverontreiniging). Text in Dutch. Chem. Tech. (Amsterdam), 27(14):375-378, 1972.*

General problems of air and water pollution measurement and monitoring are reviewed and monitoring networks, operating or planned, are referred to. Local, regional, national, and international monitoring networks, connected to a data processing and alarm center, represent the basic trend in air pollution monitoring. Multi-component systems, suitable for the simultaneous monitoring of several pollutants, such as sulfur dioxide, nitrogen dioxide, nitric oxide, carbon monoxide, ozone, hydrogen sulfide, and dust, and meteorological conditions constitute the latest stage of development. Measuring instruments are increasingly used for measurements of emissions from stacks. A continuously operating, automatic SO2 monitoring network in the Rotterdam region includes 31 monitors which are connected to a computer center via telephone lines. A national network of 250 monitors is planned in the Netherlands. Two monitoring networks in the Milan and Ravenna regions of Italy include 10 and seven monitors, respectively, which are connected to a computer center. A network of 10 monitors will be put into operation in the Basel region, Switzerland, in 1972.

24233 APTIC NO. 44329

Aikura, Tokio, Hitoshi Emi, Chikao Kanaoka, Kiyoshi Nakata, Haruo Murakami, Yasufumi Tajima, and Shoichi Nagai

PRESSURE LOSS OF MICROPOROUS FILTERS. *(Mikuro takoban no atsuryoku sonshitsu). Text in Japanese. Preprint, Japan Society of Chemical Engineering, Tokyo, p. 207-209. 3 refs. (Presented at the Japan Society of Chemical Engineering, Annual Meeting, 37th, Nagoya, Japan, 1972.)*

The dust collection mechanism and the pressure loss characteristics of microporous membrane filters were theoretically calculated and figures were compared with actual measurements. For actual measurements, commercial porous filters of micron pore size, home made membrane filters of various pore sizes, and 100 micron pore filters were used. An optical microscope was used for measuring pore diameters and the space ratio.

24234 APTIC NO. 43885

Anderson, Howard H., Rudolph H. Moyer, Donald J. Sibbett, and David C. Sutherland

SYSTEM AND METHOD OF AIR POLLUTION MONITORING UTILIZING CHEMILUMINESCENCE REACTIONS. *(Geomet, Inc., Rockville, Md.) U. S. Pat. 3,659,100. 10p., April 25, 1972. 2 refs. (Appl. Aug. 14, 1970, 23 claims).*

An instrumental system and method are presented for detecting and analyzing pollutant gases in the atmosphere, particularly sulfur dioxide, ozone, nitrogen dioxide, and nitric oxide, using the catalyzed chemiluminescence reaction of luminol with hydrogen peroxide. After appropriate treatment by an adsorption column, the sampled air streams are reacted with surface films of luminol hydrogen peroxide solutions to give continuous, real time analysis of pollutant gases. The chemiluminescence method of monitoring air pollutants uses five or six microreactors, or channels, simultaneously, which are monitored sequentially by a single photomultiplier. Channel monitoring is controlled by a rotary shutter which moves discretely from channel to channel. Quantitative analysis of the gaseous components of the atmosphere is obtained by comparison of the signals obtained from the separate channels with calibrated standards for each channel. Signal processing may use simple computer circuitry. (Author abstract modified)

24235 APTIC NO. 44442

Bassett, E. E., Jr. A. S. Bergendahl, and H. Frankel

EVALUATION OF A COMMERCIAL SELECTIVELY PERMEABLE MEMBRANE ELECTROCHEMICAL CELL COMBINATION FOR THE MEASUREMENT AND MONITORING OF LOW LEVEL SO2 CONCENTRATIONS. *Preprint, 18p., 1972 (?).*

The electrochemical cell has advantages of compactness, economy, and short response time over wet chemical analysis, gas chromatography, and electrochemical oxidation in the measurement of sulfur dioxide. The Ericson SO2 sensor is a sealed electrochemical cell with a semipermeable silicon polymer membrane allowing the transfer of SO2 proportional to its concentration in the gas stream. The oxidation current set up in the cell electrolyte is proportional to the SO2 level. Concentrations of 10 ppb are observable. Temperature response is linear between 15 and 35 C. There was no response to the common air gases at 100% concentration and 1 atm. There was no response to ammonia up to 10 ppm in nitrogen. Chlorine, nitric oxide, nitrogen dioxide, and methyl mercaptan did exhibit interferance, but not at a significant enough concentration to inhibit utility of the cell in normal use. On the other hand, hydrogen sulfide may poison the sensing electrode. No decrease in SO2 sensitivity occurs at H2S concentrations less than 100 ppb. Hydrocarbons and large pollutant molecules were not measured because of their inability to pass through the membrane or their electrical inactivity.

24236 APTIC NO. 43733

Basu, P. K., C. J. King, and S. Lynn

A THREE-COLUMN, THREE-DETECTOR GAS CHROMATOGRAPHIC METHOD FOR THE SINGLE-SAMPLE ANALYSIS OF A MIXTURE OF SICL4, CL2, COCL2, AR, N2, CO AND CO2. *J. Chromatographic Sci., 10(7):479-480, July 1972. 9 refs.*

A gas chromatographic method was developed for the quantitative analysis of a gaseous mixture of silicon tetrachloride, chlorine, carbonyl chloride or phosgene, argon, nitrogen, carbon monoxide, and carbon dioxide. Three columns and three detectors are used in series. Only one sample is required for the complete analysis, and the analysis time is about 7 minutes. The gas mixture enters the first column, which contains 15% Kel-F 10 on Chromosorb T (a Teflon packing). The fixed gases are eluted as one combined peak while chlorine, phosgene, and silicon tetrachloride are separated. The gases eluted from the first column pass on to the second column, which is packed with silica gel. This column gives a combined peak of argon, nitrogen, and carbon monoxide, and separate peaks for carbon dioxide and chlorine. Silicon tetrachloride is adsorbed very strongly, perhaps irreversibly. The argon, nitrogen, and carbon monoxide are then separated by the third column, which contains MS 5A. The third column holds carbon dioxide, chlorine, and phosgene very strongly. A rapid and accurate method for the quantitative analysis of this type of gas mixture is necessary for studying chlorination reactions. (Author abstract modified)

24237 APTIC NO. 44228

Bock, Rudolf and Bernhard Bockholt

DETERMINATION OF TRACES OF CO IN AIR. *(Bestimmung von CO-Spuren in Luft). Text in German. Fresenius Z. Anal. Chem., 260(4):274-277, July 1972. 9 refs.*

Traces of carbon monoxide in the air were accumulated by a molecular sieve (5A). The CO was determined by reduction of the silver salt of p-sulphamoylbenzoic acid and photometric measurement of the silver sol formed. Concentrations of 0.1 ppm can be determined. Methane and its homologues, ethylene, aromatic hydrocarbons, hydrogen, and sulfur dioxide did not interfere. Hydrogen sulfide, acetylene, and formaldehyde caused interferences. The method was tried out with air samples taken on the University of Mainz campus. Depending on the traffic situation, values between 0.5 and 1.2 ppm were obtained.

24238 APTIC NO. 44080

Bolton, H. C. and I. G. McWilliam

PULSE CHARACTERISTICS OF THE FLAME IONIZATION AEROSOL PARTICLE ANALYZER. *Anal. Chem., 44(9):1575-1581, Aug. 1972. 21 refs.*

An analysis is presented of the shape of the current pulse from a flame ionization detector when used to detect the current due to a burning spherical aerosol. A general account is given of the burning of a solid aerosol when controlled by inward diffusion of oxygen. The ionization produced by the burning changes the effective conductivity of the flame, and a time dependent resistance must be dealt with. The differential equation for the current pulse arising from such a circuit element is given and its solution is fully discussed. Some numerical solutions, which depend on the time constant of the circuit, are given for the particular case of the diffusion controlled burning of a solid aerosol. In addition to being general, the discussions are also applied to the burning of an aerosol when this is controlled by the surface area. The results offer a method for determining the time constant of any flame ionization detector system. (Author abstract modified)

24239 APTIC NO. 43853

Buchanan, Lee M., J. Bruce Harstad, John C. Phillips, Eugene Lafferty, Charles M. Dahlgren, and Herbert M. Decker

SIMPLE LIQUID SCRUBBER FOR LARGE-VOLUME AIR SAMPLING. *Appl. Microbiol., 23(6):1140-1144, June 1972. 5 refs.*

A new large-volume air sampler called the simple liquid scrubber is described. It recovers a high percentage of microorganisms from large volumes of air, up to 950 l/min, and concentrates them into a small volume of liquid at a ratio of about 400,000 to 1. The operating principle of the scrubber is based on the production of a fine mist in a rapidly moving airstream with ultimate collection of the airborne particles by impingement into the film of liquid formed upon impaction of the mist droplets on the scrubber walls. The scrubber compared favorably with the all-glass impinger and the slit sampler in tests with normal flora and experimental aerosols of Bacillus subtilis var. niger spores. The materials and method of the experiments are presented. (Author abstract modified)

24240 APTIC NO. 44161

Caudle, R. C.

RECENT ADVANCES IN EQUIPMENT AND TECHNIQUES FOR AIRBORNE METHODS OF POLLUTION MONITORING. *J. Soc. Environ. Engrs. (London), vol. 53:7-9, June 1972. 10 refs. (Presented at the Society of Environmental Engineers, Symposium on Environmental Engineering Aspects of Pollution Control, England, 1972.)*

Recent developments in the applications of photographic techniques and other airborne methods in monitoring various forms of pollution are described. Monitoring methods include aerial photography, infrared sensing, and optical correlation spectrometry. Applications of these methods cover traffic and car-parking, industrial dereliction, pollution affecting plants, water pollution, and air pollution. Photogrammetric plotting instruments are capable of recording rectangular coordinates in height as well as plan dimensions in the form of contoured maps, punched tape, or typed lists of data. High resolution lenses and new color films are mentioned. Healthy growing vegetation reflects more infrared radiation than growth which is diseased or affected by chemical contamination. Sewage beds which produce odor problems render a reddish image on infrared color film as compared to the black image from a normal bed. Measurements can be made of the licht scatter characteristics of the air using an instrument called a nephelometer, while an airborne optical correlation spectrometer can detect variations in sulfur dioxide concentration with an accuracy of 10 ppm over a 1 m optical path.

24241 APTIC NO. 44383

Claeys, R. R. and Donald A. Griffin

ANALYTICAL SERVICES. *In: Annual Progress Report, June 1, 1971 to May 31, 1972. Oregon State Univ., Corvallis Environmental Health Sciences Center, Center for Environmental Management Supporting Services Proj. 1, p. 97-104, 1972. 3 refs.*

The amount of sample needed for gas chromatographic-mass spectrographic separation and identification was reduced by 1/100th of that originally required by improving the electronic circuit, employing open tubular columns, and recording key m/e peaks with a potentiometric recorder. As little as 0.5 ng of dichlorodiphenyl dichloroethylene can be identified by this technique. The development of highly efficient columns is very important where complex mixtures exist, as with polychlorinated biphenyls. Sensitivity as well as separation is enhanced. This is particularly important in GC-MS since interpretation of mass spectra of simultaneously eluting peaks can be very difficult. Studies involving column length and temperature revealed the importance of maintaining optimum column flow rates and adjusting column length and temperature to meet separation and time limits. After reporting of PCB analysis with stainless steel columns, it was found that most chlorinated hydrocarbon pesticides are stable on stainless steel columns. Open tubular columns gave superior separations compared to packed columns.

24242 APTIC NO. 44217

Crecelius, Hans-Joachim and Walter Forweg

STUDY OF A POSSIBLE MUTUAL INTERFERENCE BETWEEN THE OXIDES OF NITROGEN (NO AND NO2) AT THE DETERMINATION OF IMMISSION CONCENTRATIONS. *(Untersuchung ueber eine moegliche gegenseitige Beeinflussung von Stickstoffoxiden (NO und NO2) bei der Bestimmung im Bereich der Immissionskonzentrationen). Text in German. Staub, Reinhaltung Luft, 32(6):237-239, June 1972. 19 refs.*

The possible mutual interference between nitric oxide and nitrogen dioxide in the ppm range as encountered in the determination of low-level emission concentrations was studied with test gases with known NO and NO2 contents. Experiments with absorbing solutions used for NO2 determination (Saltzman solution and 0.1 n-sodium hydroxide solution with guaiacol additive) showed no significant difference between NO2 concentrations obtained with and without NO addition to the test gas. Additions of NO2 had no influence on NO concentrations as determined through oxidizing NO to NO2 by means of known oxidizing agents.

24243 APTIC NO. 43903

Drasche, H.

A PERSONAL SAMPLER FOR GAS AND VAPOROUS POLLUTANTS. *Ein Kleinsammelgeraet (KSG) fuer gas- und dampffoermige Schadstoffe (personal sampler)). Text in German. Zbl. Arbeitsmed., 22(6): 172-176, June 1972. 20 refs.*

A portable battery-operated personal sampler is described with a throughput of 400 to 500 ml/min for the duration of 7 hours. It uses 500 mg activated coal as the adsorbent, with a grain size of 0.3 to 0.5 mm. The unit is suitable for the measurement of halogenated hydrocarbons. The adsorbed pollutants are determined by gas chromatography. The sampler comprises a nickel cadmium battery, a motor, and a membrane pump. A constant voltage is maintained. The unit was used in 1971 for determination of the concentrations of solid particles, gases, and vapors in the air to which traffic policemen are exposed.

24244 APTIC NO. 44174

Fischer, G. and H. Brantner

STUDIES OF THE AIR-POLLUTANTS IN THE GRAZ AREA, 6TH REPORT: INVESTIGATIONS INTO THE CORRELATIONS BETWEEN THE SULFATE CONTENT AND FLUORIDE CONTENT OF THE LEAVES OF FAGUS SILVATICA (COPPER BEECH), AND THEIR SIGNIFICANCE FOR THE DEMARCATION OF EMISSION-AREAS IN LARGE TOWNS. *(Studien ueber die Luftverunreinigungen im Raume Graz 6. Mitteilung: Untersuchungen ueber die Korrelativen Beziehungen zwischen dem Sulfat- und Fluorgehalt im Laub von Fagus silvatica L. (Rotbuche) und ihre Bedeutung fuer die Abgrenzung von Immissionsgebieten in Grossstaedten). Text in German. Zentralbl. Bakteriol., Parasitenk., Infektionskr. Hyg., Abt. 1: Orig., Reihe B, 155(5-6):435-444, 1972. 22 refs.*

Determinations were made of the sulfate ion content of leaf samples of Fagus silvatica L., which had grown in districts characterized by different emission concentrations. The values thus obtained were compared with the fluoride contents determined in parallel thereto. The highest concentrations of ions were found in the densely built-up regions. The fluoride ion content gradually decreased through the less densely built-up suburbs toward the open country, but the sulfate ion values remained unchanged throughout the suburban region, and then fell to normal values in the open country. If the sulfate and fluoride values found in the urban area are compared with those found in the open country, the difference is found to be significant. The calculation of the correlation coefficients for the individual groups showed a relationship that lay in the same direction but was not very close in any instance. The lowest correlation coefficient was obtained from the comparison of the fluoride and sulfate values in the urban area. Thus these two parameters are completely independent of each other. The variation of the fluoride concentration in the foliage closely corresponds to the distribution that has been discovered on the basis of lichen, urine, and sulfur dioxide analyses. Therefore, the determination of fluoride in plant samples is preferred to that of sulfate, for the qualitative determination of the extent of emission area in large cities. (Author abstract modified

24245 APTIC NO. 44177

Fischer, G. and H. Brantner

STUDIES ON AIR POLLUTION IN THE GRAZ REGION. 5TH REPORT: THE EFFECT OF EMISSION OF FLUORINE ON THE GREEN AREAS OF A LARGE TOWN. -EXPERIMENTAL INVESTIGATIONS ON FAGUS SILVATICA L. (COPPER BEECH). *(Studien ueber die Luftverunreinigungen im Raume Graz 5. Mitteilung: Der Einfluss von Fluorimmissionen auf die Gruenflaechen einer Grossstadt.- Experimentelle Untersuchungen an Fagus silvatica L. (Rotbuche)). Text in German. Zentralbl. Bakteriol., Parasitenk., Infektionskr. Hyg., Abt. 1: Orig., Reihe B, 155(5-6):425-434, June 1972. 8 refs.*

Leave samples for fluoride determination were taken from Nov. 1 to Dec. 1 of 1969 and 1970. In the entire period little precipitation fell. For the chemical analysis 5 g of dried pulverized leaves were wetted with 20 ml of calcium hydroxide solution, dried again, and ashed. The ash was then mixed with 60 ml of 75% sulfuric acid. After transfer to the distillation apparatus, 5 ml of 5% perchloric acid were added. After distillation, bidistilled water was used for dilution; 5 ml of the diluted substance was mixed with 5 ml buffer. The fluoride concentration was determined by means of an ion specific electrode. The highest fluorine levels were found in the dense city area and the directly adjoining suburban zone. Peak values between 27 and 48 ppm fluoride ions were measured in the dense northern and northwestern sections of the city. An explanation for this can be given by considering the meteorological conditions during the summer months. Winds from south to southeast prevail in this period. All air pollutants from the southern city areas are transported toward the northern and northwestern mountain barriers. In this area there are several large industries which pollute this section of the city. The mountain barrier prevents the dispersion of the polluted air. Pollutants are transported only by thermal buoyancy and on the few days with winds from the west or northwest.

24246 APTIC NO. 44291

Friedrichs, K. H. and H. Steiger

DUST-SAMPLE BLACKENING MEASUREMENTS. *(Schwaerzungsmessungen an Staubproben). Text in German. Zentralbl. Bakteriol., Parasitenk. Infektionskr. Hyg. Abt. 1: Orig., Reihe B, 155 (5-6):455-462, June 1972. 3 refs.*

Blackening measurements were conducted with the aid of the TM II apparatus. The outdoor air was compared with room air with regard to its blackening capacity. The degree of blackening amounted to 79% in a room with an open window, whereas in a room with a closed window the degree of balckening was 64%, when the blackening rate of outside air was taken as 100%. A prerequisite for the use of blackening values is their satisfactory correlation with the values of gravimetric concentration. The measuring data available are able to be approximated by means of a quadratic equation. A curve obtained at one measuring site does not show any alteration throughout prolonged periods of time (2 yrs). Comparison of blackening curves obtained for Bochum and Duesseldorf showed deviation at high concentrations (120 micrograms/cu m). Statistical examination reveals no significant difference between the two curves. In further serial measurements, the results obtained at five different measuring sites located within the town district of Duesseldorf were compared. The blackening curves show similar courses, except for the appearance of short-term local peak values. There is no significant difference between the values gained at the individual measuring sites in the 24 and 6-hr mean values. (Author abstract modified)

24247 APTIC NO. 44260

Fujinami, Kazuharu, Torao Nobusawa, Koichi Koizumi, Tsugukage Oshima, Osamu Narita, Katsumi Nonaka, Hajima Wada, Shohachiro Samasaki, Kazuo Tsurubayashi, Junji Murase, Hiroshi Minami, Tsutomu Goto, Katsuzo Nagae, and Junichi Shigeno

A RECORD OF PANEL DISCUSSION CONCERNING APPARATUS FOR INDUSTRIAL POLLUTION. *(Sangyo kogaiyo keisoku kiki ni kansuru zadankai kiroku). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 39(3):241-249, March, 1972.*

A panel discussion was given on the measurements of industrial pollutions. The topics included are the methods for sulfur dioxide and nitrogen dioxide determinations in stack gas, the reproducibility of measurement, the standard gases, the standards for offensive odors, the residue chlorine meter for sewers, the cost and sensitivity, and the future technical development. The comparisons of the neutralization method, arsenazo III method, iodimetric method, barium chloranilate method, solution conductivity method, infrared gas analysis method, and detector tube method for SO2 determinations are demonstrated. It is generally agreed that differences between results obtained from the same apparatus at the same conditions may occur, standardization of standard gases is difficult, and high cost apparatuses are usually required for high accuracy measurements.

24248 APTIC NO. 44398

Fukuseko, Tatsuichi

CASTING FOUNDRY. *(Imono kojo). Text in Japanese. Kinzoku Zairyo (Metals in Engineering), 12(5):117-126, May 1972. 10 refs.*

Pollution conditions and pollutant measurements at foundries are described. Pollutants from foundries include dust, smoke, oil vapor, metal oxides, sulfur compounds, fume, and carbon monoxide. Flue gas from cupola furnaces consists mainly of sulfur oxides and particulates containing 55% silicon dioxide and 10-20% ferric oxide and alumina. Other major sources of pollution are reverberatory, electric crucible and open hearth furnaces. Methods for measuring particulates are tabulated, including the apparatus, principles, amounts of sample for measurement, and the individual characteristics. The detector tube method for the measurement of harmful gases and the collection efficiencies of various types of dust collectors are also described.

24249 APTIC NO. 44301

Gamache, Larry D.

CONTINUOUS HYDROCARBON ANALYSIS OF DIESEL EMISSIONS. *Diesel Gas Turbine Progr., 38(8):47, Aug 1972.*

A new total unburned hydrocarbon analyzer of the flame ionization type was developed for diesel and gas turbine exhaust emission measurement. The pump selected for high temperature applications is a metal bellows type with high temperature bearings. The electric drive for the pump is located outside the oven and connected through the oven wall with a drive shaft extension. The sample hose is a composite assembly with a Teflon inner liner, silicone rubber impregnated heater element, and several outer layers of machine braided fiber glass and stainless steel. The temperature of the sample hose and the oven are independently controlled by adjustable two-mode controllers. The sample hose temperature controller is electrically interlocked with the sample pump to prevent thermal runaway from lack of sample flow. Zero and span gas is inserted into the detector by way of a small inside diameter passage which simultaneously blocks sample flow, thus eliminating the need for a three-way selector valve in the oven. Flame-out indication, installation of the flow restricting capillaries, and amplification of the detector output are also mentioned.

24250 APTIC NO. 44640

Giblin, Pamela

OPACITY AS A READILY ENFORCEABLE STANDARD. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 20p., 1972. 15 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 65th, Miami, Fla., June 18-22, 1972, Paper 72-90.)*

The major elements of a lawsuit based on equivalent opacity are presented. After Dec. 31, 1973, equivalent opacity will become statewide standard in Texas. In addition, it will be used to read smoke of any color and the limit will be lowered to 30% and 20% depending on the date the source was constructed. There are three basic elements involved in a suit based on opacity. The first is establishing the basic legal validity of equivalent opacity. Many air control programs throughout the country have adopted it, and many court cases have upheld it; so it would be difficult to prove its lack of legal validity. The second basic element of opacity litigation is the presentation of the methods by which opacity observers are trained. This is accomplished by having the smoke school instructor testify as to the detailed and rigorous training received by all certified smoke readers. In Texas, smoke schools are conducted by the State Air Pollution Control Services. In order to qualify, a smoke observer must complete 16 training sets of emission readings. After that, he must take a set of 50 readings in which his average deviation is not more than 10% and no reading varies 20% or more. The final factor in an opacity case is the testimony of the observer who made the readings by which the source in question has been found in violation. The reader must have followed all the necessary steps for accurate observations. Such factors as position of the sun, extent of cloud cover, and steam content of plume are extremely important and should be documented in the reader's Smoke Observation Forms. The original forms are admissible as evidence if the information was filled out at or near the time of the readings and if the reader can attest to their accuracy. All three elements are being dealt with successfully by air control programs throughout the country and are paving the way for increased use of opacity regulations. Ultimately, the outcome of opacity litigation hinges on the thoroughness with which the observer was trained and on the precision with which he made his readings. (Author abstract modified)

24251 APTIC NO. 43773

Greene, Nancy E. and John H. Shaw

THE IDENTIFICATION OF ATMOSPHERIC NITRIC OXIDE BY A SPECTROSCOPIC SCAN. *J. Air Pollution Control Assoc., 22(6):468-470, June 1972. 9 refs.*

The spectroscopic detection of nitric oxide at low concentrations in ambient ground-level air is described. In order to observe NO absorptance in the presence of water vapor it is necessary to use long optical paths and relatively high spectral resolution. A multiple traversal absorption cell and a grating spectometer were used to search for single lines of the 1-0 band of NO at 5.3 micron. The optical paths in the multiple traversal cell are described. The R(13/2) doublet near 1900.3/cm was used for the NO abundance measurements because of the higher atmospheric transparency in this region for large H20 concentrations. Several spectra of the region from 1897 to 1907/cm are shown. Any loss of NO after an air sample has been introduced into the cell is negligible over a period of several hours. The NO lines were positively identified in spectra of five air samples. On these occasions, the R(13/2) line showed about 5% peak absorptance. The highest NO abundances observed were between 8:30 and 10:15 am.

24252 APTIC NO. 44250

Grimmer, Gernot

THE QUANTITATIVE DETERMINATION OF POLYCYCLIC AROMATICS BY CAPILLARY GAS CHROMATOGRAPHY. *(Die quantitative Bestimmung von polycyclischen Aromaten mit der Kapillargaschromatographie.) Text in German. Erdoel Kohle (Hamburg), 25(6):339-343, June 1972.*

A survey is given of the accumulation processes for polycyclic aromatic hydrocarbons. The separation and quantitative determination by capillary gas chromatography of the components of the mixture of all polycyclic hydrocarbons obtained by this accumulation is described. Polycyclic hydrocarbons are ingested with food and are inhaled with aerosols from exhaust gases of automobiles, of power plants, of oil and coal-fired heating systems, and of incinerators. They contact the skin through lubricants and tar pastes. For a quantitative determination, the polycyclic hydrocarbons must be isolated from the initial material where they are usually present in ppm or ppb. A pure fraction of polycyclic hydrocarbons should be obtained in as few process steps as possible. In practice, two processes are applied, the liquid liquid distribution between two phases and multiplicative column chromatographic methods. As a first enrichment step the distribution between two solvent phases is recommended. For example, the first phase pair is cyclohexane-methanol water at a ratio of 10 to 9 to 1. The distribution coefficient of 3.44 for phenanthrene means that 78% of the used phenanthrene is in the cyclohexane phase. As carrier material for the chromatography of polycyclic hydrocarbons, aluminum oxide, silica gel acetyl cellulose, and synthetic granulates are suitable. A good separation is only achieved with uniform grain sizes, with grains of 0.100 to 0.125 mm diameter for aluminum oxide for instance.

24253 APTIC NO. 44575

Haertel, Otto

LONG TERM MEASUREMENTS ON SPRUCE DAMAGED BY AIR POLLUTION, USING THE TURBIDITY TEST. *(Langjaehrige Messreihen mit dem Truebungstest an abgasgeschaedigten Fichten.) Text in German. Oecol., 9(2):103-111, 1972. 19 refs.*

A simple test for the diagnosis of gas damage was developed in 1953 based on the observation that the more the leaves of conifers are damaged by gaseous contaminants in the atmosphere, the more turbid the watery decoctions they produce. A series of measurements have been conducted over the past 20 years on the basis of this Truebungstest (TT), turbidity test, in areas affected by air pollution. Its agreement with other criteria and its applicability by using statistical methods have been evaluated with the following findings: 1) there is considerable correlation between the TT and the sulfur content of spruce leaves; 2) proportionally to the SO2 emissions, the TT at first rises abruptly then continues to rise more slowly; 3) the maximal values of TT and the decline in annual growth shows growth lags behind the TT; and, 4) a diagnosis, based on the TT, proves to be an additional aid for the classification of damaged zones and appears to be advantageous in marking off damaged areas and giving large scale information as to the extent to which suspected areas are actually afflicted by gaseous pollutants.

24254 APTIC NO. 44298

Hashimoto, Yasutaka

BEHAVIORS IN ATMOSPHERE BY DUST PARTICLES OF LOCALIZED POLLUTING TYPE AND THEIR IMPACTS. REPORT NO. 1. *(Kyokushogata jinai osen ni yoru taiki osenki saku to sono eikyo). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 8(5):457-464, May 1972. 23 refs.*

The mechanism for airborne particles is discussed with a model for airborne localized dust, suspending dust, scattering dust, and precipitating dust. Localized type pollution is divided into sedimentation layers for density and sedimentation layers for diffusion. The city type pollution is sedimentation layers for mixing of density and diffusion. Reynolds numbers of the free-falling velocity of the particles are obtained by mathematical equations. The data of precipitating dust collected by Tupperware are presented. The data of comparison of suspending dust collections by digital dust indicators and by high-volume samplers are presented. The data of the relation between in-hale velocity and diameter and comparison of dust collections by impinger and by high-volume sampler are presented. The data of comparison between the analysis of particle size by cascade centripeter and W.D.S. No. 2 are presented. The amount, in percent, of components by particle number of airborne dust are presented. The comparison of precipitating and suspending dust as a function between concentration and distance are presented. The mathematical equation to show the relationship between sedimentation layers for diffusion and precipitating dust and suspending dust is discussed.

24255 APTIC NO. 43902

Hely, F.

THE HESS TEST. *(Der Hess Test). Text in German. Oel Gasfeuerung, 17(6):488, June 1972.*

The Hess test is a new measurement method for the waste gases from oil-fired domestic heaters. The sampling facility comprises a motor pump which can be regulated, a flue gas cooler, and a condensate collector. The flue gas filter that is used has a much larger cross section (25 or 33 mm instead of 6.35 mm) than the Bacharach unit. The large surface permits a better comparison of the soot speck with the grey tone scale. Unburned oil traces can be smelled. Minor traces of hydrocarbons leave no visible color. They are determined by several droplets of pyridine placed into the center of the filter. The pyridine spreads circularly, pushing the unburned oil traces to the side, so that a yellow ring forms after the pyridine has evaporated. With this new method very small hydrocarbon concentrations can be detected. The new method is already in use by inspectors of oil heating systems in Switzerland.

24256 APTIC NO. 43769

Hems, R. V. and J. B. Adams

THE DETERMINATION OF NITROGEN, OXYGEN AND SULPHUR DIOXIDE BY AUTOMATED GAS CHROMATOGRAPHY. *J. Chromatographic Sci., 10(7):476-478, July 1972. 16 refs.*

Automated gas chromatography was applied to the determination of nitrogen, oxygen, and sulfur dioxide. The sample components are initially separated by a dynonyl phthalate precolumn to give SO2 and a composite air peak. The air enters a molecular sieve 5A column which is then isolated by valve switching; the SO2 by passes the 5A and is detected by thermal conductivity measurement. Carrier gas flow is subsequently switched back to the 5A for the separation and detection of the air components. Sample injection and flow switching are performed by pneumatic slide valves, operated automatically by solenoid valves in conjunction with a punched card timer. A vacuum inlet system is provided for accurate gas sampling at atmospheric pressure. Oxygen in the range 0.1-25% and SO2 concentrations in the range 200 ppm 10% v/v can be determined within 7 min. (Author abstract modified)

24257 APTIC NO. 44146

Herzel, F. and E. Lahmann

INSECTICIDE DETERMINATION IN ATMOSPHERIC AIR BY MEANS OF THE FILTER METHOD. *(Insektizid-Bestimmungen in atmosphaerischer Luft mittels der Filtermethode). Text in German. Gesundh. Ingr., 93(7):202-205, July 1972. 8 refs.*

For the insecticide determination in atmospheric air, a high volume sampler with glass fiber filters was used. The collection area of the glass fiber filters was 18 times 23 cm (414 sq cm). The sampler draws on about 80 cu m air/hr or about 2000 cu m/24 hr. The samples were taken on the roof of Bundesgesundheitsamt (health department) in Berlin-Dahlem. For the analysis, a modified gas chromatographic method was used. According the results of laboratory investigations, high substance losses through the influence of the air flowing through the filter occur. This was confirmed by the outdoor measurements. A maximum of 1.35 ng/cu m gamma-hexachlorocyclohexane and of 8.45 ng/cu m DDT was found in the 24-hr samples of atmospheric air. The true insecticide concentration of the air must be higher according to the laboratory studies.

24258 APTIC NO. 43800

Hirai, Yoshiaki

PROGRESS OF POLLUTION MEASURING INSTRUMENT. *(Osen sokuteiki no shinpo). Text in Japanese. Hyojunka to Hinshitsu Kanri (Stand. Qual. Control), 25(5):11-13, May 1972.*

The progress and development of pollution measuring methods and instruments in the U. S. are reviewed. When the problem of smog came to public attention in Los Angeles for the first time some 20 years ago, the infrared ray spectrophotometer was known to very few. Los Angeles set up the Smog Alert System in the following years, under which the atmosphere was continuously analyzed by means of a wet type continuous analysis. To measure ozone under this system, it was made to react with potassium iodide and analyzed by measuring the concentration of iodine liberated. Sulfurous acid gas was reduced to sulfuric acid by oxidation and then measured conductometrically. However, later studies have revealed that the smog is not so simple as first thought. Even the reaction of ozone with potassium iodide is found subject to a multiplication effect, thus distorting the qualitative analysis of the ozone. Since the conventional wet type analysis measures the value only after a gaseous test sample is reduced to a liquid form, it is subject to more errors due to the liquefaction. The recent trend is toward the use of a chemicophysical method in which a sample gas is analyzed as it is. The NDIR spectophotometer is one developed in this line. For air pollution analysis, a gas chromatograph combined with a special detector is used for sulfur dioxide analysis and the NDIR for carbon monoxide analysis. Future versions of these analyzers will be a pushbutton control type.

24259 APTIC NO. 43789

Hochrainer, D. and G. Zebel

MEASUREMENT OF THE SIZE DISTRIBUTION OF AEROSOLS WITH AN IMPACTOR. *(Messung der Groessenverteilung von Aerosolen mit einem Spektralimpaktor). Text in German. Umschau (Berlin), 72(13):439-441, July 1972. 2 refs.*

An impactor has been developed which permits the collection of particles according to size in a single stage. In a round nozzle a central flow of clean air is concentrically surrounded by an aerosol flow which is sandwiched in by another flow of clean air. The flow through the nozzle is accelerated to a velocity of about 100 m/sec. Shortly after the nozzle exit there is an impaction plate, which deflects the gas flow. Large particles arrive on the center of the impaction plate because they are not influenced by the laterally expanding inner clean air flow. Smaller particles are deflected to the side by this flow and land more on the peripheral sections. A preselection of particles takes place according to size in the nozzle. Particles with an aerodynamic diameter between 0.5 and 5 micron can be deposited by this impactor.

24260 APTIC NO. 44242

Imano, Kenichi

MEASUREMENT OF INDOOR AIR POLLUTION. *(Shitsunai kuki osen no sokutei) Text in Japanese. Kuki Chowa Eisei Kogaku (J. Japan Soc. Heating, Air Conditioning, Sanitary Engrs.), 46(6):564-574, June 1972. 9 refs.*

Indoor air pollution is discussed with emphasis on sulfur dioxide, ammonia, carbon monoxide, ozone, carbon monoxide and hydrocarbons, plus suspended dust and lack of oxygen. The adverse effects of pollutants on human health, are discussed with reference to the threshold limit values of the American Conference of Governmental Industrial Hygienists and others. The chemical characteristics, emission sources, and health effects of the harmful gases and of lack of oxygen are tabulated. Analysis methods listed include the p-rosaniline, rosaniline absorption spectrophotometric, conductometric method, and detection tube methods for SO2, the phenolphthalein and red litmus paper methods for ammonia; the iodine dioxide and detection tube methods for CO; the potassium iodide method for ozone; the iodine method for oxygen; the interferometer method for CO2, and the molybdenum or methylene blue method for hydrogen sulfide. Also listed are Japanese threshold limit values for various harmful gases and various types of dust measuring instruments. Among the latter are the Royco particle Monitor, digital dust meter, thermal precipitator, cascade impactor, impinger, glass-fiber filter and hi-volume sampler. Several methods for measuring suspended bacteria, including the Koch and Anderson methods are briefly described.

24261 APTIC NO. 44165

Innes, William B.

CONTINUOUS ANALYSIS OF REACTIVE ORGANICS BY SELECTIVE COMBUSTION. *Environ. Sci. Technol., 6(8):710-715, Aug. 1972. 23 refs.*

The selective combustion method for analysis of hydrocarbons, involving thermocatalytic oxidation effects in a vanadia-alumina catalyst bed, can be used for rapid continuous analysis of a wide range of organics providing the ratio of catalyst volume to flow rate is low, and proper steps are taken to prevent condensation and sorption effects in the inlet system. Under such conditions, response increases and selectivity decreases with temperatures up to 400 C on a variety of organics. Response passes through a maximum with flow rate, the flow rate maximum decreasing with the ease of oxidation. Reversible deactivation from aromatics can be neglected above 350 C, but is significant at lower temperatures. Idle exhaust derived from leaded fuels does not deactivate the catalyst over prolonged periods under 400 C. Liquids containing organics including exhaust condensate can be analyzed after evaporation in dry air. A substantial fraction of the total response to vehicle exhaust is associated with the condensible fraction. Responses at optimum conditions on gasoline vehicle sources would be expected to be essentially additive, linear, and give good correspondence with photochemical reactivity. Actual comparisons of smog effects vs. instrument responses are needed to prove the correspondence. (Author abstract modified)

24262 APTIC NO. 44153

Ishii, Takeshi

POLAROGRAPHIC ANALYSIS OF AIR POLLUTANTS. (2) ANALYSIS OF ORGANIC MATERIALS. *(Porarogurafu-ho o mochiiru taiki osen bunseki. (Sono II) Yuki seibun no bunseki). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 8(7):665-672, July 1972. 65 refs.*

Polarographic analysis of organic compounds including aldehydes, surface active agents, olefins, acetylenes semicarbasone derivatives, thiophene, benzene, benzene hexachloride, DDT, and polychlorinated biphenyls is discussed. The differential polarographic method has been applied to the analysis of formaldehyde in air at a concentration of 0.00096-0.0085 mg/l. Furfural, HCHO, and acetaldehyde in air are separated and determined at -1.42 V, -1.72 V, and -1.87 V, respectively, using 0.1 N lithium hydroxide as the basic solution. The half-wave potentials and diffusion coefficients of phenylethylene and phenylacetylene and their derivatives are listed. The results of polarographic analyses of semicarbasones have usually been in good agreement with those obtained by ultraviolet spectrometry. Microanalysis of BHC in air has been carried out with the polarographic method at 5.5% accuracy. Half-wave potentials of DDT derivatives are also tabulated.

24263 APTIC NO. 44083

Jahr, Jorgen

A NEW DOUBLE FILTER METHOD FOR THE SEPARATE DETERMINATION OF HYDROGEN FLUORIDE AND DUST-LIKE FLUORIDES IN THE AIR. *(Eine neue Doppelfiltermethode zur separaten Bestimmung von Fluorwasserstoff und staubfoermigen Fluoriden in der Luft). Text in German. Staub, Reinhaltung Luft, 32(6):248-252, June 1972. 2 refs.*

The method was developed for personal sampling, but is also suitable for other purposes. The air is drawn through two successive filters in one holder. The first filter is untreated, the second impregnated with sodium formate. Particulate fluorides are collected quantitatively on the first filter, whereas hydrogen fluoride is found on both. By heating for 20 hr at 75 C in the closed filter holder, the HF collected on the untreated filter is transferred quantitatively to the second, impregnated filter. Leaching the two filters separately after the heat treatment allows the determination of the fluoride ion on each filter by the use of a fluoride-ion specific electrode. The suitable range of the method is approximately from 0.4 micrograms F (-) and upwards for the particulate, and between 0.4 micrograms and 5 mg for HF. (Author summary modified)

24264 APTIC NO. 44510

Kalb, G. William and Charles Baldeck

THE DEVELOPMENT OF THE GOLD AMALGAMATION SAMPLING AND ANALYTICAL PROCEDURE FOR INVESTIGATION OF MERCURY IN STACK GASES. *TraDet, Inc., Columbus, Ohio, Environmental Protection Agency Contract 68-02-0341, APTD-1171, 84p., June 8, 1972. 10 refs.*

NTIS: PB 210817

A method was developed for collecting and analyzing mercury in power plant stack gases. A standard isokinetic sampling train was modified, using two impingers containing 10 g of gold chips to collect the mercury vapor as an amalgam. Particulates containin mercury were collected on a fiber glass filter upstream of the gold amalgam. The modified impinger containing the mercury amalgam was transferred to an induction furnace which volatilized the mercury. An air stream was used to carry the mercury through a quartz optical cell positioned in the 254 millimicron mercury line of an atomic absorption spectrophotometer for calculation from a peak on the strip chart recording the absorption pattern. The analytical parameters and procedures, stack sampling procedures, and field results are reviewed. Under optimum conditions, the percent recovery on the first amalgamator is about 95%, with possible decrease due to gold deterioration and possibly stack turbulence. (Author conclusions modified)

24265 APTIC NO. 44129

Kashiki, M., Seigo Yamazoe, and Shozo Oshima

QUANTITATIVE ANALYSIS OF LEAD IN GASOLINE BY UNIFIED STANDARD ATOMIC ABSORPTION ANALYSIS. *(Toitsu hyojun genshi kyuko bunsekiho ni yoru gasorin chu no teiryo bunseki). Text in Japanese. Japan Petroleum Inst., Tokyo, Proc. Symp. Japan Petroleum Inst., 15th, 1972, p. 9-12. 5 refs. (July 10-11.)*

When atomic absorption analysis was first applied to the quantitative determination of lead in gasoline, isooctane was used as the solvent and tetraethyl lead as the standard lead. Subsequent investigators have varied the analytical procedure by using tetramethyl lead and mixed lead alkyls in addition to TEL, or by using methyl ethyl ketone as the solvent and lead nitrate or 8-hydroxyquinolinate as the standard lead. Since the absorbance differs with the type of lead used, these methods yield different values. Another problem involving the methods is the tailing phenomenon. A new method has been designed to solve all these problems and give satisfactory results. In this method, the sample gasoline (TEL, TML, or MLA s) is dissolved in methyl isobutyl ketone (MIBK), to which a specific amount of iodine is added, and then led to the flame. The operating conditions for lead determination were: wavelength (nm), 283.3; lamp current (mA), 8; air flow (l/min), 23.8; acetylene flow (l/min, 3.3; burner height (mm), 8.0 (0 division); response time (sec), 1; noise suppression, 1; scale expansion, 1; slit width (mm), 1. Various alkyl lead compounds had an identical absorbance when about 3 mg of iodine/50 ml of MIBK was added to the sample. The addition of iodine also solved the tailing phenomena problem, as did the addition of bromine or other halogenated compounds. The halogen effect remained the same even when other types of solvent were used. The calibration curve prepared (when iodine was added) showed a sufficiently linear relation between absorbance and concentration. This method can be applied to trace analysis of up to 0.0005 g Pb/l.

24266 APTIC NO. 43757

Kitani, S., S. Uno, and J. Takada

DIRECT MEASUREMENT OF VARIABLE AEROSOL CONCENTRATION IN A FAST REACTOR CHAMBER. *(Kosokuro kakuno yokinai earozoru nodo henka no jido sokutei sochi no kaihatsu shisaku). Text in Japanese. Kuki seijo (Clean Air - J. Japan Air Cleaning Assoc., Tokyo), 10(2):34-36, June 1972. 4 refs.*

An automatic densitometer for the detection of aerosol concentration in reactor chamber was developed to fulfill the requirements of detection of aerosols at high temperature, and detection of radioactive aerosols and alkali aerosols. The new apparatus was designed using a previously described digital particulate detector, based on the fact that when white light is directed on aerosols, it is scattered, and by detecting the scattering light at 135 deg to the direction of incidence with a photoelectric tube, the aerosol concentration can be calculated from the resulting photoelectric current. Sodium oxide aerosol generated from the combustion of sodium metal in air at 50 C and uranium oxide aerosol from the combustion of uranium metal in air at 800 C are used as samples for tests. Correlations exist between the concentrations obtained from the samplings on air filter and the relative intensities of the scattering light.

24267 APTIC NO. 44034

Kotrappa, P. and M. E. Light

DESIGN AND PERFORMANCE OF THE LOVELACE AEROSOL PARTICLE SEPARATOR. *Rev. Sci. Instr., 43(8):1106-1112, Aug. 1972. 17 refs.*

The Lovelace aerosol particle separator provides a continuous separation of aerosol particles in the micron and submicron size ranges according to their aerodynamic equivalent diameters. This new device uses the principle of centrifugal separation of particles in a spinning spiral duct. The Lovelace aerosol particle separator is essentially a spinning rotor driven by a motor at a desired constant speed. An aerosol sample is drawn into an expanding spiral duct through an inlet at the axis of the rotor and is entrained in a laminar stream of clean air and drawn by negative pressure through the channel. The particles are deposited according to their aerodynamic diameters along a collection foil lining the outer wall of the spiral duct and the very small particles on a filter at the exit end of the spiral, thereby providing a continuous separation of aerosol particles in the entire size range of interest. Calibration of the separator is discussed. (Author abstract modified)

24268 APTIC NO. 44140

Kreuzer, L. B., N. D. Kenyon, and C. K. N. Patel

AIR POLLUTION: SENSITIVE DETECTION OF TEN POLLUTANT GASES BY CARBON MONOXIDE AND CARBON DIOXIDE LASERS. *Science, 177(4046):347-349, July 28, 1972. 9 refs.*

Detection sensitivities of a few ppb for 10 gaseous pollutants have been evaluated by measuring the strength of the absorption of infrared radiation from carbon monoxide and carbon dioxide lasers. Ethylene concentrations as small as 5 ppb have been detected in air. The measured absorption strengths indicate that in mixtures of pollutants, such as nitrogen dioxide and water vapor, the sensitivity is reduced by overlapping absorption bands. However, calculations indicate that it should be possible to detect nitrogen dioxide concentrations of 0.01 ppm in the presence of water vapor concentrations of 100,000 ppm. Other pollutants measured were: ammonia, benzene, 1,3-butadiene, 1-butene, methanol, nitric oxide, propylene, and trichloroethylene. (Author abstract modified)

24269 APTIC NO. 44100

Leichnitz, Kurt

SIMULTANEOUS CO AND CO2 DETERMINATION WITH TEST TUBES. *(Gleichzeitige CO- und CO2-Bestimmung nach dem Pruefroehrchenverfahren). Text in German. Oel Gasfeuerung, 17(7):578-580, July 1972. 1 ref.*

A new test tube for the simultaneous determination of carbon monoxide and carbon dioxide is described. It comprises two individual tubes which are connected with each other by a combination of a jacket and a synthetic hose. The first tube holds the CO indicator, iodine pentoxide, selenium dioxide, sulfuric acid, and silica gel the second the indicator for CO2 (hydracine). The separation of the CO indicator from the CO2 indicator is necessary to permit a storage of the test tubes for a period of two years. Concentrations of 200 to 2500 ppm CO and of 2 to 12 vol.% CO2 can be measured. The CO reacts with the indicator yielding a brown to brownish green color. The length of the discolored section is indicative of the CO concentration. For the CO2 measurement the consumption of the hydracine is made visible by a redox indicator (purple coloring). From the length of the purple colored section, the CO2 concentration can be read from the scale in vol%.

24270 APTIC NO. 43722

Liberti, Arnaldo, Massimiliano Possanzini, and Mario Vicedomini

THE DETERMINATION OF THE NON-VOLATILE ACIDITY OF RAIN WATER BY A COULOMETRIC PROCEDURE. *Analyst, 97(1154):352-356, May 1972. 3 refs.*

A precise and accurate method for the determination of the non- volatile acidity of rain water or of any dilute acid solution is described. The method is based on the coulometric titration of a sample from which carbon dioxide has been removed by bubbling nitrogen through it. The end-point is detected by potentiometry with a glass electrode by using Gran s theory. The acidity from both strong and weak acids is determined. The average standard deviation is + or 5% and the limit of sensitivity 0.1 micrograms/ml (calculated as sulfuric acid). (Author abstract modified)

24271 APTIC NO. 44237

Lorenz, Gerhard

MODERN MEASUREMENT PROCEDURES IN THE FIELD OF EMISSION CONTROL. *(Modern Messverfahren im Rahmen des im Imissions- und Emissionsschutzes). Text in German. GIT (Glas-Instrum-Tech.) Fachz. Lab., 16(6):699-700, June 1972.*

The principles of modern measurement procedures for gaesous and particulate pollutants are reviewed. The quantitative and qualitative determination of gaseous pollutants can be based on stoichiometric reactions, titration of absorbed matter, or conductivity measurement before and after absorption. Photometric procedures are mainly used for sulfur dioxide, infrared absorption techniques for carbon monoxide, while flame-ionization detectors are most suitable for the determination of hydrocarbons. The principle of gas chromatography, as used for emission control purposes, is elucidated. Electric conductivity measurements, infrared absorption, and flame-ionization techniques are designed chiefly for continuous determination. Particulate pollutants can be determined by precipitators which, however, do not furnish volume-related values, or by dust concentration measur0ing instruments. Dust concentration measurements can be made by means of gravimetric and light absorption techniques (photoelectric scanning of dust-covered surfaces and smoke density measurement for high concentrations). The principles of light scattering and beta absorption techniques are described. Scintillation spectral analysis is suitable for qualitative and quantitative determination and for the determination of the granulometric distribution.

24272 APTIC NO. 44073

Maritz, F.

ENVIRONMENT PROTECTION IN THE CHMICAL INDUSTRY: DETERMINATION OF REFUSE DATA AND SUPERVISION OF THE PRODUCTION PLANTS. *(Umweltschutz in der chemischen Industrie: Erfassung von Abfalldaten und Ueberwachung der Productionsstaetten). Text in German. Chem. Rundschau (Solothurn), 25(2):31-32, Jan. 1972.*

Owing to the continuously expanding production volume of the chemical industry, efforts have to be made to solve the developing environmental problems. Many chemical plants installed special laboratories to determine various technical data of effluents and solid waste to examine new control methods. Emissions are usually measured in chimneys or exhaust gas systems and analyzed by chemical methods, photometry, gas chromatography, or electrochemical reactions. Sulfur dioxide, nitrogen oxides, hydrocarbons, aldehydes, and hydrochloric acid are measured in the atmosphere. Air purification plants must be continuously supervised by automatic pH-value, temperature, and photometric measurements.

24273 APTIC NO. 44288

Matsushita, Shukaku

ODOR QUALITY IN VARIOUS CHEMICAL COMPOUNDS. *(Kakushu kagaku busshitsu ni taisuru nioi no shitsu). Text in Japanese. Akushu no Kenkyu (Odor Research J. Japan), 2(6):8-16, June 1972.*

The formulas and odor qualities of chemical compounds are listed. The chemical compounds include 33 inorganic compounds such as carbon monoxide and metal compounds, 20 hydrocarbons, 16 offensive odors such as amines and mercaptans, 26 alcohols, 20 ethers, 15 carboxylic acids, 22 esters, 26 aldehydes, 4 acetals, 8 halides, 11 amines, and 12 sulfur compounds, 12 nitrogen compounds, 24 heterocyclic compounds, and 11 macrocyclic compounds.

24274 APTIC NO. 44045

Meyer, Gianni

EQUIPMENT DESIGNED FOR THE DETERMINATION OF POLLUTANTS IN WATER AND AIR. *(La strumentazione per il controllo degli inquinanti dell acqua a dell aria-!). Text in Italian. Inquinamento, 4(4):37-40, March 1972.*

To control pollution from improper fuel combustion by thermal installations, the law requires that each installation be equipped with a thermometer measuring the temperature of the combustion gas at the base of each stack, two instruments measuring relative pressure (in the combustion chamber and at the base of the stack), an instrument indicating the volumetric concentration of carbon dioxide, an instrument indicating the volumetric concentration of carbon monoxide plus hydrogen, or the excess oxygen content of the combustion gas, or smoke opacity. To measure combustion gas temperature, mercury expansion thermometers are used for temperatures up to 600 C, or thermocouples or electric resistance thermometers may be used. To measure CO2 and CO+H2 content, an electrophysical analyzer is used, consisting of two chambers where the respective gases are measured by the principle of variation of resistance of a platinum wire heated electrically in a medium of the gas to be analyzed. Since thermal conductivity of CO2 is greater than that of air, the platinum wire dissipates more heat, cools, and its resistance is lowered. With CO+H2, catalytic combustion occurs which increases temperature and the resistance of the platinum wire. This analyzer furnishes electrical signals which are relayed to a recorder. Pressure and draught are measured by a manometer or by a toroidal coil. Opacity is measured photoelectrically by means of a photocell placed on top of the stack. All measurements in thermal installations with an output in excess of one million Kcal/hr must be continuous and monitoring panels must be under constant supervision.

24275 APTIC NO. 44246

Minzl, E.

DETERMINATION OF H2SO4-SPRAY, H2SO4-MIST AND UNABSORBED SO3 IN WASTE GASES FROM H2SO4 CONTACT PLANTS. *(Bestimmung von H2SO4- Spruech, H2SO4-Nebeln und nicht basorbiertem SO3 in Abgasen von H2SO4-Kontaktanlagen). Text in German. Chem.-Ing.-Tech., 44(13): 858-860, July 1972. 5 refs.*

The apparatus for the measurement of the sulfur-containing components in the waste gas from sulfuric acid production plants consists of four segments which are made of polytetrafluorine ethylene. Gas samples are taken with a glass probe reaching 3 cm into the gas pipe. In the probe, part of the coarse spray is retained. In the first segment the remaining coarse spray (to about 5 micron in diameter) is retained by impaction and deflection In the second segment fine spray and H2SO4 mist is adsorbed on asbestos. In order to prevent any sulfur trioxide adsorption at this stage the gas flow is heated to 90 C. In the third segment moist air is drawn on for cooling the gas. At the same time, part of the SO3 is converted to H2SO4 mist. In the fourth segment the remaining SO3 is separated. About 4 to 6 l gas/min can be drawn through the apparatus. The contents of the various segments is flushed into a flask with distilled water and titrated with n/10 Sodium hydroxide and an indicator. The apparatus was tested in five absorption towers. A comparison of the results obtained for the individual towers shows a good reproducibility. The errors are lower with larger gas quantities.

24276 APTIC NO. 44127

Mori, Masaki

RECENT PROGRESS IN AIR POLLUTION MEASUREMENT TECHNOLOGY. *(Kogai keisoku ni okeru taiki* *osen sokutei gijutsu no shindankai). Text in Japanese. Keiso (Instrum.), 15(2):15-19, Feb. 1972. 13 refs.*

The detection of ozone, nitric oxide, and nitrogen dioxide by the chemiluminescent method is discussed together with the detection of NO and NO_2 by the ultraviolet method and the detection of sulfur dioxide by a flame photometric detector (FPD). The detection of O_3 and NO by the chemiluminescent method is based on the fact that O_3 reacts with ethylene and NO with O_3 to luminesce, respectively, in a luminescence cell. The small luminescence is then magnified and detected. The detection ranges of most of the O_3 detectors are 0-0.2 ppm, 0-0.5 ppm, and 0-1.0 ppm, and high sensitivity photoelectron magnifiers are available. The potassium iodide colorimetric method is used for the correction of this detector. The reaction of NO with O_3 produces luminescence at 600-875 millimicron. The detection range of 0-0.5 ppm required for NO in air has not been achieved. The NO_2 in the mixture of NO and NO_2 must first be reduced to NO before it can be detected. An ultraviolet method has been developed for the detection of NO and NO_2 mixtures. The NO_2 is first detected at 400 millimicron; the NO is then allowed to react with oxygen at 50 C and 50 kg/sq cm and detected as NO_2. The detection of SO_2 by the FPD is based on the luminescence that occurs at 300-423 millimicron when a sulfur compound is introduced into a hydrogen flame. Its intensity is measured after filtering at 394 plus or minus 5 millimicron. A combination of gas chromatography and FPD has been used for the separation and continuous detection of SO_2, hydrogen sulfide, and methylmercaptan.

24277 APTIC NO. 44622

Mumma, Victor R., Albert L. Thomas, Jr., and Robert H. Collins, III

A PARTICLE SIZE ANALYZER FOR AEROSOLS. *Ann. N. Y. Acad. Sci., 99(1):298-308, June 29, 1962. 7 refs.*

An instrument for counting and sizing aerosol particles is described. This laboratory-type photometer is covered with a light-tight cover when in use, and a tungsten ribbon filament source is imaged on an aperture, which in turn is imaged above a hypodermic needle. Aerosol particles are drawn from the needle and through the highly illuminated volume located above the needle. The particles scatter light as they pass through the illuminated volume. This light is collected by a lens system and the light pulses detected by a 1P21 photomultiplier that converts the light pulses into voltage pulses which are then amplified. The light pulses and resulting voltage pulses are proportional to the size of the particle and can be used as a measure of the particle size. The voltage pulses are presented to a pulse height analyzer having one or more voltage windows or channels. In such instruments the pulses that arrive with sufficient voltage height to pass the lower boundary, but not to exceed the upper boundary of the voltage window, are counted in that particular size grouping. These channels are adjusted in width to eliminate the nonlinearity of particle size to pulse size and to accommodate size groupings of interest to the investigator.

24278 APTIC NO. 44004

Nakahara, Shojiro, Katsuyoshi Ito, Sho Ito, Shoichi Tamura, Ichiro Taniguchi, and Akira Fuke

LASER RADAR FOR STACK EFFLUENT MONITORING. *(Haien kanshiyo reza roda). Text in Japanese. Mitsubishi Denki Giho (Tokyo), 46(5): 561-568, May 1972. 15 refs.*

Laser radar for use in pollutant monitoring through the application of Mie scattering and Raman scattering is discussed. By Mie scattering, in which the wavelength of incidence light and that of scattering light are the same, and the particles in air show a large scattering cross section area, the measurements of stack gas diffusion, the effective stack height, temperature inversion layer, and visibility can be easily and effectively performed. By Raman scattering, in which an individual gas molecule has a scattering light of specific frequency, the measurements of the concentration of individual pollutants in a mixture is possible. Experimental results show that Mie scattering of the effluent from a power plant stack of 160 m high with a gas discharge velocity 13 m/sec and wind velocity at 3.5 m/sec provides satisfactory information on the diffusion of gas and the effective stack height. Detections of nitrogen gas at a distance of 300 to 450 m and sulfur dioxide at 100 m show that the experimental results are consistent with results obtained from calculation.

24279 APTIC NO. 43785

Naritomi, M. and S. Fukuda

REVIEW ON AIRBORNE RADIOIODINE SAMPLING IN THE FIELD OF RADIATION MONITORING. *(Hoshasen monitaringu no tame no fuyu yoso no sanpuringu ni tsuite). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 10(2):79-94, June 1972. 49 refs.*

Activated carbon filter paper or a cartridge are widely used as the airborne iodine sampling material. To obtain higher detection sensitivity by selectively collecting the iodine or to collect samples containing particulates other than iodine, a combination of a dust collecting filter paper and the activated carbon filter paper and/or the activated carbon cartridge gives satisfactory results. The collection efficiencies of several activated carbon filter paper and/or the activated carbon cartridge gives satisfactory results. The collection efficiencies of several activated carbon filter papers are listed, as well as that of the activated carbon cartridges, with the sampling conditions. The collection efficiency is high when the sample contains more inorganic iodine compounds, and low when more organic iodine compounds are contained. The collection efficiency of a cartridge depends largely on the shape of the cartridge and the packing density. High humidity decreases the collection efficiency of the filter paper significantly with organic compounds, and inorganic compounds have little change.

24280 APTIC NO. 44057

Pilastro, F. and M. L. Foglino

FOUNDRY AND AIR POLLUTION. *(La fonderia e l inquinamento atmosferico). Text in Italian. Fonderia Ital., no. 4:119-122, 1972.*

The different departments of cast iron foundries emit crystalline silica, inert suspended particulates, carbon monoxide, and sulfur dioxide. Median 24 hour maximum allowable concentrations on the premises are 0.02 mg/cu m, 0.30 mg/cu m, 20 ppm, and 0.15 ppm respectively. Tolerated concentrations are higher, namely 0.1 mg/cu m in 120 min, 0.75 mg/cu m in 120 min, 50 ppm in 30 min, and 0.3 ppm in 30 min. Carbon monoxide is monitored continuously by an IR non-dispersive photometer with two light sources fed in series yielding a complete IR spectrum. A rotating obturator situated in front of the light sources alternately intercepts and passes the two bundles of rays. Coaxially with the light rays are two series of cells, one a measuring cell through which the gas to be analyzed passes continuously, the other a reference cell filled with an inert gas which does not absorb IR rays. The gas to be analyzed must be filtered and dehumidified before measurement. The rays are filtered by filter cells to become insensitive to variations in carbon dioxide concentrations. The detector situated behind the cells, consisting of two chambers with pure CO divided by a membrane, records the energy difference of the two bundles of rays by a pressure difference induced by a difference in the cooling effect. Carbon monoxide concentration is indicated by a potentiometric recorder. Sulfur dioxide is monitored continuously by an autoanalyzer working on the colorimetric principle with the intensity of the coloration due to pararosaniline sulfonic acid being measured continuously by a colorimeter. The determination of particulates presents difficulties due to the requirement to perform sampling under isokinetic conditions. The Anderson Stack Sampler, comprising a probe, filter, and Pitot tube, meets this requirement.

From the samples thus obtained, free silica is determined by X-ray diffraction or by chemical methods.

24281 APTIC NO. 43745

Purrett, Louise A.

ANALYZING THE ATMOSPHERE. *Sci. News, 102(4):60, July 22, 1972.*

Trends in the concentrations and types of aerosols and increases of carbon dioxide are considered in relation to their future effect on the atmosphere and on the world s climate. Measurement systems for carbon dioxide, carbon monoxide, ozone, dust from agricultural activity and volcanism, and other trace constituents in the atmosphere are discussed. Location sites away from pollution sources for the installation of monitoring systems are reviewed. The capacity of the atmosphere to cleanse itself naturally is considered.

24282 APTIC NO. 43720

Renshaw, G. D., C. A. Pounds, and E. F. Pearson

VARIATION IN LEAD CONCENTRATION ALONG SINGLE HAIRS AS MEASURED BY NON-FLAME ATOMIC ABSORPTION SPECTROPHOTOMETRY. *Nature, 238(5360): 162-163, July 21, 1972. 4 refs.*

Hair grows at a rate of approximately 1 cm/mon, accumulates lead, and thus forms a permanent record of lead content in the body which may be used to estimate the time and length of lead exposure. Trace elements in hair may also indicate the environmental level of other elements which could be hazardous to health, including arsenic, cadmium, copper, and zinc. It is possible to obtain a detailed record of lead exposure from analysis by non-flame atomic absorption spectrophotometry on sections of a single hair. Analyses were performed on a Perkin-Elmer 303 atomic absorption spectrophotometer equipped with an HGA-70 furnace atomizer. The absolute detection limit for lead with this system is 5 times 10 to the minus 11th g. The lead concentration in hair increases significantly from the root to the tip of the hair, suggesting that lead has entered the hair by deposition on its surface, followed by diffusion into the hair structure. By analysing several sections of single hairs from the same head at regular time intervals, sudden exposures to lead should be readily detected, especially if a proximal section of the hair shows a sharp increase in lead concentration over its neighboring section. Other metals, such as thallium, zinc, cadmium, copper, and iron, may also be monitored in a similar manner.

24283 APTIC NO. 44487

Rom, Jerome J.

MAINTENANCE, CALIBRATION, AND OPERATION OF ISOKINETIC SOURCE SAMPLING EQUIPMENT. *Office of Air Programs, Research Triangle Park, N. C., Applied Technology Div., Pub-APTD-0576, 41p., March 1972. 2 refs.*

An isokinetic source-sampling train has four major components: (1) the pitobe assembly, which includes the probe nozzle, a heated glass probe, and a pitot tube for monitoring gas velocity during sampling; (2) the meter box assembly, which consists of a system of manometers, an orifice meter, a vacuum pump, a dry gas meter, and electrical controls for sampling; (3) the sample box assemble, which contains the glassware; and (4) the umbilical cord, which connects the sample box with the meter box. The maintenance and calibration procedures described for each of the components are to be followed in the shop or laboratory in preparation for each sampling test. Procedures final sampling train assembly, sample run, and shutdown are described.

24284 APTIC NO. 44144

Sakai, Kaoru

CURRENT STATUS OF POLLUTION MEASUREMENT INSTRUMENTS AND THEIR SOFTWARE. I. *(Kogai keisokuki no genjo to sono sofutowea (I)). Text in Japanese. Keiso (Instrum.), 15(2):20-23, Feb. 1972. 6 refs.*

Instruments for air pollution measurements, including gas samplers and instruments for automotive emissions, are reviewed. High speed, low-speed, and cold-trap sampling methods are graphically illustrated. It is necessary to heat the sampling tube leading to a cold trap to 200 C or higher since for stack gas containing 10% moisture and 0.0015% sulfur dioxide, the dew point is close to 140 C. A nonscattering gas analyzer has been developed and successfully used for measurements of carbon monoxide, carbon dioxide, and total hydrocarbons. The interference of water with CO2 detection by this type of infrared gas analyzer is prevented by placing a filter cell filled with H2O in front of the sample cell. The detection ranges of this continuous recorder are 0-12% for CO, 0-16% for CO2, 0-2000 ppm for hydrocarbons, and 0-500 ppm for nitric oxide. The chemiluminescent method is used for the detection of nitrogen oxides by measuring the intensity of the luminescence at 600 millimicron after NO2 is allowed to react with ozone. The detection range of this method is usually 0.01 ppm-1%.

24285 APTIC NO. 44274

Sandroni, Santino

REMOTE SENSING OF ATMOSPHERIC POLLUTION. *Eurospectra, 11(2):56-64, June 1972. 4 refs.*

The two most important applications of remote measurement, from the ground or from an aircraft or space vehicle, are the monitoring of emissions and the evaluation of the average concentration. A further item of information that can be ascertained by remote sensing is the vertical burden of a toxic substance, that is, the measurement of how much of the population is present in the column of air between the ground and an inversion layer. Spectroscopic techniques are the most promising for the remote detection of gas traces, in particular, absorption of infrared, ultraviolet, or visible light of a frequency characteristic of the pollutant, and elastic or inelastic scattering by aerosols and certain gases. Lasers constitute valid sources because they are monochromatic, coherent, and of sufficient power. A portable spectrometer designed for the simultaneous determination of sulfur dioxide and nitrogen dioxide at the maximum sensitivity of 1 ppb for a distance of 1 km by measurement of ultraviolet absorption (3100 A for SO2) and visible light absorption (4000 A for NO2) is described. Operational principles of tunable infrared lasers, including lasers with semiconductor dioxides and spin flip Roman lasers, and first-and second-generation Ladar systems are described.

24286 APTIC NO. 44378

Sasawaki, Yukio

DEVELOPMENT OF ENVIRONMENTAL ANALYZER. *(Taikyo bunsekikei no kaihatsu). Text in Japanese. Kagaku Kogyo (Tokyo), 23(9):1189-1193, Sept. 1972. 1 ref.*

A general discussion is given on the factors to be considered when developing environmental analyzers. A device with a measuring capacity two to five times that of the concentration to be measured is usually required for the possible changes of natural and operational conditions. Although consumers are always demanding devices with very high accuracies, it is difficult to meet the demand due to noise, weather, and voltage problems. For measuring, + or -2 to 5%, and for monitoring, + or -1 to 2% are considered to be accurate. Other factors to be considered are reliability, stability, and response.

24287 APTIC NO. 43712

Schnelle, Karl B., Jr. and R. Douglas Neely

TRANSIENT AND FREQUENCY RESPONSE OF AIR QUALITY MONITORS. *J. Air Pollution Control Assoc., 22(7):551-555, July 1972. 9 refs. (Presented at the Air Pollution Control Assoc., Annual Meeting, 64th, Atlantic City, N. J., June 1971, Paper 71-5.)*

Results of dynamic or transient tests and steady state calibration of carbon monoxide and sulfur dioxide continuous air quality monitors are reported. Standard gases and permeation tubes were used to establish low level concentrations for the steady-state calibration and the dynamic testing. The steady-state calibration was in excellent agreement with results obtained from grab samples of the calibration gas stream taken with standard gas bubblers and analyzed by the West and Gaeke procedure. New dynamic testing techniques were applied to determine the transient and frequency response characteristics of these air quality monitors. The results of the dynamic step and pulse test indicate a transfer function which serves as an adequate model to describe the transient and frequency response. There are indications that the SO2 monitors are dynamically too slow in response to exhibit violations of regulations specifying maximum limits not to be exceeded by short time periods. (Author abstract modified)

24288 APTIC NO. 43715

Smith, A. F. and R. Wood

A FIELD TEST FOR THE DETERMINATION OF SOME KETONE VAPOURS IN AIR. *Analyst, 97(1154):363-371, May 1972. 7 refs.*

A field test is described for the determination in air of those ketones most commonly used industrially, in concentrations up to twice their current threshold limit values. The vapor is collected in water and the solution allowed to react with acidic 2,4-dinitro- phenylhydrazine solution. The addition of methanolic potassium hydroxide results in the formation of a red color, which is compared visually with standards after 10 min. A common series of standards is used for all the ketones, the volume of absorbent used and the size of sample taken being dependent on the identity of the ketone present in the atmosphere. The apparatus and method used are simple and the time required for a complete determination is between 25 and 50 min. (Author abstract modified)

24289 APTIC NO. 44195

Takahashi, Akira

THE PRESENT SITUATION OF AUTOMATIC ANALYSIS OF AIR POLLUTION. *(Taiki osen no jido bunseki no genkyo). Text in Japanese. Eisei Kagaku (J. Hyg. Chem.), 18(2):47-55, April 1972.*

Apparatuses and methods presently used in Japan for automatic analyses of air pollutants are described. A method used at the National monitoring stations for the measurement of sulfur oxides is the solution conductivity method in which both sulfur dioxide and trioxide are oxidized to sulfuric acid and the change of conductivity of the solution is measured. The Saltzman method is used for the analyses of nitrogen oxides based on the fact that nitrogen dioxide reacts with certain reagents and developes colors which are photometrically detected. Nitric oxide is first oxidized as NO2 before reacting with the Saltzman reagent. For the measurement of ozone, a photometric method is used in which iodine is generated, by the reaction of O3 and potassium iodide, and detected with a light of 365 nm. A hydrogen flame ionization detector is used for the measurement of hydrocarbons by detecting the current generated from the ionization of the HC by the hydrogen flame. Both a light scattering method and a filter paper spot method are used for the measurement of dust concentration. All apparatus are described and shown graphically.

24290 APTIC NO. 44327

Takahashi, Takeshi, Akira Kanagawa, and Teruo Tsunoo

SAMPLING OF AEROSOL PARTICLES BY THERMO-SAMPLER. *(Netsusekiryoku ni yoru enmatsu ryushi no sampuringu). Text in Japanese. Preprint, Japan Society of Chemical Engineering, Tokyo, p. 195-197, 1972. 2 refs. (Presented at the Japan Society of Chemical Engineering, Annual Meeting, 37th, Nagoya, Japan, 1972.)*

As an effective sampling method of solid particles and relatively low steel pressure liquid particles, the thermo-sampler operation mechanism was studied using a dioctyl phthalate aerosol. The equipment is made of an upper part containing the heating elements and a lower section which contains cooling water. The aerosol entering from the inlet disperses in two directions. One side of the cooling wall has a cover glass for an optical microscope and the other side has an incision for the mesh of an electron microscope. The gap between two walls is 1.05 mm, width 50 mm, and length 47 mm, and when aerosol passes through this gap, the particles are thermally ejected and sampled on the cover glass and the mesh. Sampling particle distribution was examined by a microscope and the distance required from the aerosol inlet for a complete collection of particles was both calculated and measured. Calculations and measurements were compared and some discrepancy was noted, probably due to the complex temperature distribution in the thermal sampler. But the number of collected particles agreed with a 5% error.

24291 APTIC NO. 44639

Tannenbaum, H., D. Tanenbaum, H. DeLong, E. R. Schildkraut, S. Klainer, and T. Hirschfeld

REMOTE RAMAN FIELD MEASUREMENTS OF ATMOSPHERIC TRACE CONTAMINANTS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 18p., 1972. 2 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 65th, Miami, Fla., June 18-22, 1972, Paper 72-11.)*

The remote Raman spectrophotometric technique utilized an ultraviolet laser to stimulate Raman emission from airborne compounds and monitor these frequencies for identification and analysis. A truck-and trailer-mounted system was built which exceeded original performance specifications. The system used a doubled ruby laser operating at 3472 A and a 36-inch diameter collecting telescope. Three adjustable frequencies were monitored, two for detection of compounds of interest, and the third for referencing to atmospheric nitrogen. Laboratory measurements were made which permited projection of remote monitoring sensitivity to a wide range of air pollutants. The system lends itself to detection and quantitative analysis, as well as ranging and cloud mapping applications. Sensitivities range upwards from less than 0.1 ppm of sulfur dioxide, depending upon Raman scatter cross sections of the compounds of interest. Methods for improving system sensitivity are presented. It offers significant advantages over any other potential remote monitoring technique. Field tests were begun in Feb. 1972, at Fort Devens, Mass., and initial results were excellent. Ladar returns from measured targets were used to optimize and calibrate the system. Better than anticipated signal returns were obtained from atmospheric nitrogen, oxygen, water vapor, and carbon dioxide. Spinning disc aerosol generators were utilized to disseminate kerosene as a relatively low vapor pressure compound to test system performance. It was possible, on a qualitative basis, to follow intermittent generator output. The remote Raman technique offers a unique capability for remote monitoring of a wide range of air pollutants. These applications include large-area quantitative monitoring, cloud mapping, tracking of pollutant clouds to their sources, and stack monitoring. Present systems are extremely complex, large, and very costly. The potential advantages are such, however, that significant effort is warranted to advance the technology to the point where the technique becomes more practical. (Author abstract modified)

24292 APTIC NO. 43746

Tsuzuki, Koji

MINI-COMPUTER APPLICATION TO AIR POLLUTION OBSERVATION SYSTEM. *(Taiki osen kanshi shisutemu e no mini-kon riyo). Text in Japanese. Ohm, 59(4):45-48, April 1972.*

The air pollution observation system in Aichi Prefecture consists of three main sub-systems, the terminal or end system, the transmission system, and the data processing system. Mini computers are utilized in the transmission and data-processing sub- systems. Activated by the pulse signal from the time piece, the data processing device calls each observation station every 20 min and receives the data (concentration of sulfur oxides, suspended dust, wind direction and velocity, temperature, and humidity) from the observation station which transmits the data after converting analog outputs to A/D and digital output to scale of two. The received data are checked for both horizontal and vertical parity. The received data are stored by station and measuring item in the received data area. After scale conversion including the automatic scaling of data, scaling by measuring range, scaling of wind direction, and scaling to 1-hour value, they are stored in the scaling storage area and finally transmitted to the time-data storage area where the data are stored by each measuring time. Generally, the data obtained during 24 hours are memorized while some (such as sulfur oxides) are for 48 hours. At the end of a day (24 hours), the day s maximum, minimum, and average values are typed out by item with date, hour, and name of station. An asterisk is printed to indicate lack of that particular datum and the value exceeding the limit. Calm is printed when the wind velocity is 0.5 m/sec or lower.

24293 APTIC NO. 43714

Warner, Peter O. and Larry Saad

A PRELIMINARY STUDY OF THE EFFECTS OF ROOF TAR EVAPORATE ON OXIDANT LEVELS MEASURED BY IODIDE COLORIMETRY. *J. Air Pollution Control Assoc., 22(7):556-557, July 1972. 8 refs.*

Forms of iodometric coulometry or colorimetry are widely used in the detection of ozone. In examining various sources of positive interference with this measurement technique, it was determined that the closer the approach of the entrace intake of the sampling probe to the surface of the tarred roof on which it was located, the higher the positive ozone reading. Further proof of this effect was observed by an initial test in which 2 g of the actual sun-irradiated tarring material was extracted with distilled water, and the aqueous extract introduced as sample into the potassium iodide absorbing solution ahead of the continuous colorimeter. This aqueous extract produced an instrument read out equivalent to 0.19 ppm ozone. It is recommended that considerable care be exercised in the placing of rooftop samplers to prevent the entry of tar evaporate in the samplers.

24294 APTIC NO. 43908

Weisheit, W. and L. Stottmeister

DETERMINATION OF TERTIARY AMINES IN WASTE AIR. *(Bestimmung von tertiaeren Aminen in Abluft.) Text in German. Gesundh. Ingr., 93(6):179-182, June 1972. 4 refs.*

Tertiary amines are used as catalysts for the production of polyurethanes. Tertiary amines have an intense odor and are considered physiologically harmful. Complaints by neighbors in the vicinity of a polyurethane production plant caused the owner to order the measurement of the amine concentration at the working places and in the emitted waste air. Preliminary studies of suitable measurement methods brought the best results with a mixture of acetanhydride and malonic acid. Weighed quantities of the amines to be measured were dissolved in o-dichlorobenzene. A certain quantity of this solution was filled into a 50 ml measurement flask. After the addition of 1 ml reagent solution (2 g malonic acid in 100 ml acetanhydride), the flask was filled with o-dichlorobenzene, closed, and heated for 120 min at 100 C. The solution assumed a yellow to yellow-brownish color. After cooling, the amine concentration can be determined by photometric measurement. For the quantitative determination of amines in waste air, three successive 100 ml glass fritted scrubbers containing O-dichlorobenzene were used. The error margin was found to be + or 15%.

24295 APTIC NO. 44145

Yamamoto, Susumu and Osayuki Yokoyama

LASER RADAR OBSERVATIONS OF THE STACK PLUMES (I). *(Reza reda ni yoru kemuri no kansoku (I)). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 7(2):105-110, March 1972. 8 refs.*

The development of the pulse ruby laser has enabled the direct extention of radar techniques to optical wave lengths. Since it can detect the small particles which make up the aerosol content of the atmosphere and smoke plumes, laser radar is expected to prove a valuable tool in air pollution research. Laser radar techniques to measure the stack plumes and experimental results from the Kashima industrial area are described. Preliminary observations of the stack effluent are presented. The results of the observations have proved that the present ruby laser radar, having a rather low repeating pulse frequency, is satisfactory for the measurement of average height and spread of stack gas plume. (Author abstract modified)

24296 APTIC NO. 44207

Yamazaki, Shohachiro

THE PRESENT CONDITIONS AND PROBLEMS OF BAD ODOR MEASURING METHOD. *(Akushu sokutei-ho no genjo to mondaiten). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 39(8):743-751, Aug. 1972. 5 refs.*

The measurement of offensive odors and several measuring devices are described. There are 13 compounds listed as offensive odors, namely: methylmercaptan, ethylmercaptan, dimethyl sulfide, diethyl sulfide, hydrogen sulfide, methylamine, ethylamine, trimethylamine, ammonia, butylene, butyric acid, acetone, and acrolein. There are six degrees for the indications of odors by sensation. Using CH_3SH as an example, the concentrations are 0, 0.041, 0.57, 7.9, 110, and 1500 ppm, respectively, where the second degree indicates merely perceivable and the sixth degree indicates extremely odorous. Three measuring devices including a Nader type, an Olfactotester type, and a Yamazaki type, and one odor removing device are shown graphically. An ASTM method, by which the sample is taken into syringes and diluted into .1, .01, .001, and .0001, and the odor is detected by comparing the diluted samples, is also described.

24297 APTIC NO. 44344

Yomogihara, Natsuko

MEASUREMENT OF OXIDANT. *(Okishidanto no sokutei ni tsuite). Text in Japanese. Preprint, Ministry of International Trade and Industry (Japan), Public Nuisance Resources Research Inst., p. 113-118, June 1972. (Presented at the Public Nuisance Resources Research Institute Research Seminar, Tokyo, Japan, 1972.)*

The measurement of oxidant is done in such a way that the neutral potassium iodide absorbs the air which contains the oxidant and the isolated iodine is measured by a colorimeter or electrochemical methods. The diagrams of a colorimeter and a electrochemical meter accompanied with the description of their operation is shown. Usually oxidant meters measure ozone instead of oxidant itself. Therefore the components cannot be analyzed by oxidant meters. This is why the components other than ozone have to be checked, especially nitrogen dioxide. The NO_2 was measured by four oxidant meters on the market. The results comparing four meters are illustrated and shown in a table. The data of the relationship between NO_2 concentration and ozone are shown in graphs.

24298 APTIC NO. 44290

Yoshida, Masaaki

STUDIES IN THE PSYCHOLOGY OF OLFACTION (6). QUANTITATIVE ASPECTS OF ODOURS. (Kyukaku no riron (6), kyukaku no teiyoteki sokumen). Text in Japanese. Akushu no Kenkyu (Odor Research J. Japan), 2(6):1-7, June 1972. 3 refs.

A general discussion is given on the human tolerance and the measurement of offensive odors. The determination of an odor is difficult due to individual differences. Therefore, the selection of a panel for examination is important. A system, in which odors are categorized into six degrees, has been proposed and is adopted by the Japanese Bureau of the Environmental Protection Agency. The six degrees are labelled by numbers from 0 to 5 which indicate no odor, just perceptible, faint, easily noticeable, strong, and very strong, respectively. Other systems include the determination of the degree of odor by comparing the sample with standard odors and the determination by diluting the sample into different concentrations and comparing the differences in odor.

24299 APTIC NO. 44178

Yoshida, Y. and Y. Ikezawa

PERFORMANCE CHARACTERISTICS OF FILTER PAPERS FOR RADIOACTIVE AEROSOL SAMPLING. *(Hoshasenj jinai sanpuringu yo roshi no tokusei) Text in Japanese. Kuki Seijo (Clean Air J. Japan Air Cleaning Assoc., Tokyo), 10(2):41-48, June 1972. 25 refs.*

The characteristics of various filter papers, including cellulose, cellulose-asbestos, glass fiber, and membrane, used for sampling radioactive aerosols are discussed. Summarized test data show that Whatman 41 and Toyo no. 5A, both cellulose filter papers, have low collection efficiencies at low filtering velocity and higher efficiencies as the velocity increases. However, the error for concentration estimation is high at high collection efficiency. The surface collection efficiency is about 60-70% and is not suitable for the collection of alpha radioactive dust. The error of concentration estimation of cellulose-asbestos filter paper HV-70 is within a few percent at a filtering velocity higher than 30 m/min. Filter paper HE-40 has better performance characteristics than HV-70. Glass fiber filter paper Gelman E shows a very small error on the concentration estimation and high collection efficiency regardless of the filtering velocity and dust category. Membrane filter paper Millipore shows excellent collection efficiency but weak stretching strength and high pressure loss.

24300 APTIC NO. 44139

Zwicker, J. D.

UNCERTAINTIES IN THE CENTRIFUGAL SEDIMENTATION PARTICLE SIZE ANALYSIS METHOD. *Powder Technol. (Amsterdam), 6(3):133-138, 1972. 9 refs. (Presented at the American Ceramic Society, Annual Meeting, 71st, Washington, D. C., May 1969.)*

Examination of the size distribution of particles in a sedimentation tube at various stages of a centrifugal sedimentation method revealed that the distributions did not follow those predicted by Stokes Law. Generally, the sedimentation curves generated by this method agree reasonably well with other sizing methods for log-normal distributions, but for other distributions the results are unsatisfactory. The mechanism by which the centrifugal sedimentation method operates remains unknown, but a possible explanation is discussed. (Author summary modified)

AIR QUALITY MEASUREMENTS

24301 APTIC NO. 43754

Tokyo Metropolitan Environmental Protection Research Inst. (Japan)

PROGRESS REPORT ON TOKYO PHOTOCHEMICAL SMOG: DATA I (FIELD STUDIES, STEREOGRAPHIC STUDIES). *(Tokyo kokagaku sumoggu chukan hokoku, shiryohen I (Yagai chosa, rittai chosa kekka)). Text in Japanese. 309p. March 1972.*

Measurements of various pollutants were taken at 14 locations in Tokyo in summer of 1971 in order to conduct a special investigation on photochemical smog. The data is presented in tables. Sulfur dioxide was measured by the conductivity method; nitrogen oxides were measured by the Saltzman method; oxidants were measured by neutral potassium iodide colorimetry; ozone was measured by the ethylene chemiluminescent method; suspended particulates were measured by light dispersion photometry; hydrocarbons were measured by a flame ionization detector and gas chromatography; peroxyacetyl nitrate was measured by the ECD Ni (63)(???); nitric acid ion and sulfuric acid ion were measured by high volume air sampler and the distillation extraction method; formaldehyde was measured by the pararosanilin method. Helicopters and kitoons (combination of kite and balloon) were also used for measuring oxidant and SO2. The SO2, NO2, formaldehydes, and suspended particulates were measured daily and hourly during the summer, and oxidants and ozone were measured for various periods of consecutive days.

24302 APTIC NO. 43759

Ministry of International Trade and Industry (Japan), Resources Investigation Council

ADVICES ON THE USE OF RESOURCES AND ADJUSTMENT FOR ENVIRONMENTAL PROTECTION IN HIGHLY CONGESTED AREAS - THE QUALITY OF LOWER ATMOSPHERE AND PROTECTION OF SURFACE ANIMAL AND PLANT LIFE IN SOUTH KANTO REGION. *(Komitsudo chiki ni okeru shigen riyo to kankyo hozen no chowa ni kansuru kankoku. -- Kanto nanku ni okeru kaso taiki no sitsu to hypo seibutsu no hozen o chushin to site). Text in Japanese. 1972, 447p.*

The local circulation of the lower atmosphere in the southern Kanto area is described, as well as the general condition and estimation of air pollution, and the animal and plant indicators of the environment. There were 27 days which had a closed structure of the lower atmosphere, that is, a maximum mixing depth less than 850 ml, daily rain less 2 mm, and average wind velocity lower than 4 m/sec, in the year of 1970. The amount of heavy oil consumption was about 22,000,000 kl and the amount of sulfur dioxide discharged was about 625,000 tons in the same year. These are compared to the results obtained from model equations. The irreversible damages to various kinds of plants in the area were investigated. Improvements of land utilizations in highly polluted areas are also discussed.

24303 APTIC NO. 43971

Nagano Prefectural Inst. of Public Health and Nuisance (Japan)

REPORT ON INVESTIGATIONS AND RESEARCHES. *(Chosa kenkyu hokoku). Text in Japanese. Nagano-ken Eisei kogai kenkyusho Chosa kenkyu Hokoku (Bull. Nagano Prefect. Inst. Public Health Public Nuisance), no. 10:1-102, March 1972.*

Air pollution data in Nagano Prefecture was collected for 15 days from 1970 to 1971. The concentration of carbon monoxide, nitrogen dioxide, and dust is higher on the highways than off. The concentration of sulfur oxides does not differ. On the main highways, the concentration of CO is 8.4 ppm, nitric oxide is 0.063 ppm, NO2 is 0.033 ppm, SO2 is 0.023 ppm, and dust is 0.94 mg/cu m. The traffic rate is 300 automobiles/hr to 1000 automobiles/hr. The relationship between daytime traffic and pollution is not clear. The average CO concentration between 1 am to 7 pm is 1.5 ppm. The concentration of pollution on the highways decreases in inverse proportion as the distance from the highways increases. The pollution of the highway has no effect at a distance of 50 m away. The background concentration of pollution of the city is: dust 0.1 to 0.2 mg/cu m, SO2 0.005 to 0.01 ppm, CO2 to 3 ppm, NO 0.005 ppm, NO2 0.01 ppm.

24304 APTIC NO. 44170

SURVEILLANCE NETWORK RECORDS AIR POLLUTION. *Mod. Power Eng., 66(6):42-43, June 1972.*

Under the Clean Air Act, a coordinated national air pollution surveillance network is being established in Canada. The purpose of the program is to monitor and assess the quality of the ambient air in the populated regions of Canada on a continuous basis. Data is now being collected in 37 major cities across Canada, and the aim is to provide continuous monitoring in 48 urban areas by 1974. Information from 237 sampling instruments is being gathered by cooperating agencies and forwarded to the Environment Department for compilation. Measurements new being taken include soiling index, suspended particulates and lead, dustfall and sulfation rate, and sulfur dioxide. Measurement equipment and procedures are described.

24305 APTIC NO. 44330

Tokyo Metropolitan Government (Japan), Minato Ward Office

THE PRESENT CONDITION OF PUBLIC NUISANCE BY AUTOMOBILES. *(Jidosha kogai no jittai). 72p., 1972.*

The conditions of air pollution and noise caused by automobiles were investigated in one particular area of Minato Ward in Tokyo, on Sept. 17 and 18, 1970, within an area of 300 m radius. Carbon monoxide was measured at 13 points of the intersection using pumps and mylar bags, and analyzed by nondispersion infrared spectrometry. Nitric oxide and nitrogen dioxide were measured at eight points by gas samplers and the improved Jacobs method. Hydrocarbons were sampled at the same 13 locations where CO was measured, and analyzed by flame ionization detectors. Suspended particulates and lead were measured from the samples captured by hi-volume samplers; lead was analyzed by atomic absorption spectrophotometry. Odor was measured by sensitivity tests at three points. Noise and traffic amount were also measured. Questionnaires were sent to the area's inhabitants in order to investigate their health conditions. The lead content in the inhabitant's blood samples were taken. The maximum measurements of CO ranged from 5 to 11 ppm at various locations which averaged out to be 2 to 7 ppm. Hydrocarbon measurements ranged from 0.3 ppm to 3.5 ppm. The NO measurements averaged at 0.038 ppm, and NO2 ranged from 0.009 to 0.034 ppm. The dust concentration ranged from 83 micrograms/cu m to 811 micrograms/cu m, and the lead concentration ranged from 0.6 micrograms/cu m to 4.5 micrograms/cu m. The maximum figures of dusts and lead were detected at the same location.

24306 APTIC NO. 43713

Bayley, E. and A. Dockerty

TRAFFIC POLLUTION OF URBAN ENVIRONMENTS. *Roy. Soc. Health J. (London), 92(1):6-11, Jan.-Feb. 1972. 13 refs.*

Observations were made at an intersection in Digbeth, Birmingham of carbon monoxide levels and traffic intensities. Carbon monoxide concentrations were measured by a nondispersive infrared gas analyser. Street air was continuously drawn through the apparatus at a rate of 0.7 l/min by means of a small electric pump incorporated in the instrument. Traffic intensities were measured by means of Fischer and Porter punched tape output recorders. Standard road tubes were used, and visual observations of vehicle type were also recorded. The traffic composition approximated a commercial/passenger vehicle ratio of 30:70. While the number of diesel powered vehicles remained relatively constant during the mid-day and evening peak traffic flow periods, the number of gasoline powered vehicles accounted for 84% of the evening peak traffic, but for only 76% of the mid-day peak flow. From 44 days of continous CO sampling, the accumulated periods corresponding to concentration levels in excess of 10, 30, and 50 ppm were 1303.5, 14.1, and 1.5 minutes, respectively. The relation between traffic intensity and CO is shown graphically. When compared with the accepted maximum concentration for sustained industrial exposures to CO, the concentrations recorded at Digbeth do not constitute a health hazard to the pedestrian public. The effect on motor vehicle drivers of exposure to consentrations of this order is more difficult to predict. Reports differ concerning the effects of increased blood carboxyhemoglobin content on psychomotor function. The possibility of a relationship between levels of CO and lead is discussed.

24307 APTIC NO. 44235

Ford, Erich

AIR POLLUTION AND HOW TO COMBAT IT. *(Luftverschmutzung und ihre Bekaempfung). Text in German. Gesundheitstech., 6(6):107-113, June 1972. 2 refs.*

Great Britain has given particular attention to the air pollution problem and accomplished some remarkable results. Smoke emission was reduced by 60% between 1951 and 1968 despite a 10% population increase and a 17% rise of the gross power consumption. The Clean Air Act of 1956 forbids the emission of dark smoke. The air in Northern England, the Midlands, and in London is more heavily polluted with sulfur dioxide than the rest of the country. Particularly in London, it is much heavier than smoke pollution. Extensive research concerning air pollution measurements is carried out in the Air Pollution Division of the Warren Springs Laboratory. The effect of stacks on pollutant dispersion is studied on scaled-down models in wind tunnels where the wind speed, wind direction, climatic conditions, and other relevent factors can be simulated. To determine the carbon monoxide pollution of the major cities such as Birmingham, Manchester, Enfield, Glasgow, Cardiff, and Portsmouth the Warren Springs Laboratory took measurements over a period of 13 to 15 months. Random samples were taken at certain points in the six cities, 2.75 m vertically above the street curb. The measurement of the CO concentration was carried out with an infrared gas analyzer. The lowest CO concentration of 10 ppm was measured between 0 and 8 am, the highest between 5 and 6 pm. This time coincides with the traffic rush hour. The concentrations ranged from 10 to 60 ppm. Measurements of the pollution caused by airplanes revealed that the highest emissions were caused by the rolling of the airplanes over the starting and landing strip.

24308 APTIC NO. 44351

Fukuoka, Saburo, Mitsuru Udagawa, Masanao Funajima, and Toshio Ohara

CONSIDERATION ON RESULTS OF CONTINUOUS MEASUREMENT OF CO AT AND AROUND THE INTERSECTION. *(Kosaten shuhen issanka tanso joji chosa kekka no kosatsu). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), no. 3:47-56, 1972. 8 refs.*

Continuous measurement of carbon monoxide concentrations for 24 hours during autumn 1970 through March 1971 was carried out at six intersections in Tokyo. The measurement was performed at the corner of intersection, at the roadside 50-100 m away from the intersection, and in the neighborhood area of intersection. A non-dispersive infrared spectroscopic analyzer was used for analysis. A triplex air sampler was attached to the analyzer and sampled for about 15 minutes. Districts with heavy traffic or bad road conditions were always exposed to CO pollution. Especially at the roadside, the mean concentrations of CO/mo and/hr were frequently over 10ppm. The CO concentration measured at the point 50 m or more away from the roadside was less than half of that at intersection. Daily fluctuation of CO in winter at and around the intersection had two peaks. On Sundays and holidays, the level of CO concentration generally was a lower value. Concentrations of CO and nitric oxide were in close correlation at the roadside, but did not have a good correlation in the area behind the road. The CO concentration and wind wind velocity generally had an inverse relation.

24309 APTIC NO. 43860

Gibbs, Graham W. and Maurice Lachance

DUST EXPOSURE IN THE CHRYSOTILE ASBESTOS MINES AND MILLS OF QUEBEC. *Arch. Environ. Health, 24(3):189-197, March 1972. 27 refs.*

Past and present features of the Quebec chrysotile mining and milling environment and methods used to establish indices of exposure for epidemiological studies are described. Environmental dust concentrations used for calculation of dust exposure indices were derived mainly from systematic midget impinger samples taken since 1948, and from field surveys made in 1968, using impinger and a variety of other techniques. Though dust levels within the industry fluctuated widely, there was a steady fall from an average of approximately 75 million particles/cu ft in 1948 to less than 10 million particles/cu ft in 1968. Considerable variation in the fiber content of airborne dust in this industry suggests that any safety standard should probably take account of fibrous and nonfibrous components. (Author abstract)

24310 APTIC NO. 43975

Gordon, G. E., W. H. Zoller, E. S. Gladney, A. G. Jones, and P. K. Hopke

NEUTRON ACTIVATION STUDY OF TRACE ELEMENTS ON BOSTON-AREA ATMOSPHERIC PARTICLES. *Preprint, American Chemical Society, Washington, D. C., 11p., 1972. (Presented at the American Chemical Society National Meeting, Boston, Mass., April 9-14, 1972.)*

Concentrations of 25 elements attached to atmospheric particulate material in the Boston area were measured, and the sizes of particles to which most of these elements were attached were determined. Samples were collected at several sites in the Boston area with air filters and cascade impactors, then analyzed by instrumental neutron activation analysis. The following major sources are indicated for the various elements: soil and rock dust and fly ash from coal combustion: aluminum, iron, calcium, and scandium; residual oil combustion: vanadium, selenium and and antimony; sea salt: sodium and chlorine; auto exhaust: bromine; and several sources of comparable strength: chromium, manganese, cobalt, and cerium. Copper and zinc concentrations, although rather small, are about 20-fold greater than expected on the basis of the sources noted. Possible sources not yet studied are auto tires (for zinc), industries, and municipal incinerators. The most notable feature of the Boston atmosphere is its high concentration of vanadium, largely from residual fuel combustion, which is among the most prominent metals on Boston-area particulates. Vanadium and other transition metals may speed the conversion of sulfur dioxide gas to more dangerous chemical forms, such as sulfur trioxide and sulfuric acid. Among the elements studied, several are attached primarily to particles small enough to be inhaled and deposited in the lungs; these include vanadium, zinc, antimony, selenium, and bromine. Measurements were not performed on lead, arsenic, and nickel in the Boston area, but recent studies in the Washington, D. C., area show that these toxic elements are attached to small particles.

24311 APTIC NO. 44478

John, W., R. Kaifer, K. Rahn, J. J. Wesolowski

TRACE ELEMENT CONCENTRATIONS IN AEROSOLS FROM THE SAN FRANCISCO BAY AREA. *Preprint, California Univ., Livermore, Lawrence Radiation Lab., 27p., Jan. 12, 1972. 12 refs.*

Twenty-nine trace elements in the air over the San Francisco Bay Area were classified into a soil-derived aerosol group, a marine aerosol group, and a third group of elements whose relative concentrations may be significantly altered by anthropogenic pollution sources. The third group includes selenium, zinc, bromine, and mercury. Samples from nine Bay Area monitoring stations were subjected to neutron activation analysis. A statistical correlation analysis was used to group the elements. The elemental abundances from the analysis were compared to calculated abundances based on iron concentration in the soil group and sodium in the ocean group. The analysis was also used to assess whether the locations of specific monitoring stations are representative of their surrounding area. (Author abstract)

24312 APTIC NO. 44644

Raynor, Gilbert S., Maynard E. Smith, and Irving A. Singer

TEMPORAL AND SPATIAL VARIATION IN SULFUR DIOXIDE CONCENTRATIONS ON SUBURBAN LONG ISLAND, NEW YORK. *Preprint, Air Pollution Control Association, Annual Meeting, 65th, Miami, Fla., June 18-22, 1972, Paper 72-131.)*

Results of tests of mean hourly sulfur dioxide measurements taken at 11 monitoring stations in the study area over a 2-year period are presented. Results of tests indicate that sulfur dioxide concentrations of suburban Long Island show a rather constant spatial distribution pattern with the maximum in the center of the island near the New York City boundary. Concentrations decrease eastward and towards the shores. All stations show a well marked annual cycle with highest concentrations usually in December or January and the lowest in summer. The amplitude of the cycle is highest at the western stations. The diurnal cycle is also pronounced and, again, the western stations show the greatest variation. The pattern changes from winter, when a maximum occurs soon after sunrise and a minimum near sunset, to summer, when a broad mid-day peak is evident. Both the average concentration and the time of the morning peak vary with distance from New York City, suggesting the metropolitan area as the source of much of the sulfur dioxide on Long Island. However, a detailed statistical analysis to show the relative importance of local and metropolitan sources has not been made. (Author abstract modified)

24313 APTIC NO. 44234

Severs, Richard K. and Leslie A. Chambers

DIFFERENCES IN METAL AREAL DISTRIBUTION DISPLAYED BY TREND-SURFACE ANALYSIS. *Arch. Environ. Health, 25(2):139-145, Aug. 1972. 8 refs.*

Trend-surface computer maps were prepared to estimate the areal concentration isopleths of cadmium, copper, magnesium, manganese, lead, and zinc, suspended particulates, and the associated benzene- soluble concentrations which occurred on April 13, 1970. The samples were collected from a 17-station ambient air surveillance network in Houston and then analyzed. A comparison of maps indicates important areal differences in the distribution of all pollutants. Suggestions are made as to how these maps could be used for further studies based on areal data. (Author abstract modified)

24314 APTIC NO. 44133

Weatherley, Maria-Louise

EFFECT OF SUSPENSION OF SMOKE CONTROL ORDERS ON SMOKE CONCENTRATES. *Clean Air, 1(6):9-10, Summer 1972.*

In 1970, because of a shortage of solid smokeless fuels in Great Britain, orders were made by the Secretary of State for the Environment, at the request of individual local authorities, temporarily suspending the operation of smoke control orders in their areas. To quantify the effect on pollution in the affected areas, local authorities making smoke measurements were asked whether or not their measurement sites were within suspended smoke control areas. The information supplied also specified whether or not sites were within 400 yards of the edge of a suspended smoke control area. Using this information, two lists were drawn up, one of sites well within areas in which smoke control orders had been suspended, and one of sites well away from such areas. Valid comparisons show that over the period January to March 1971 the group of sites in suspended smoke control areas had extra smoke, attributed to suspended particulates, amounting to about 13 micrograms/cu m, on the average for the group as a whole. Some sites in this group had additional smoke during this period, up to 100 micrograms/cu m more, in a monthly average, which may or may not have been due to the suspension, while others showed no increase, or a decrease of up to 30 micrograms/cu m in a monthly average, compared with the corresponding month in the previous winter. The number of sites affected was only a small proportion of the total. The relatively small average increase reflects the fact that there is a definite trend away from solid fuel and towards gas and electricity for domestic heating. (Author conclusions modified)

ATMOSPHERIC INTERACTION

24315 APTIC NO. 44247

GLOBAL AIR POLLUTION. *(Globale Luftverunreinigung). Text in German. Umschau (Frankfurt), 72(14):471-472, July 1972. 2 refs.*

Part of the oxygen in the atmosphere is present in the form of ozone with a concentration maximum in the middle stratosphere. It is feared that supersonic airplanes will reduce the stratospheric ozone concentration. Since ozone absorbs part of the short-wave ultraviolet (UV) radiation, a reduction of the ozone concentration could mean that the earth's surface is exposed to a higher dose of UV radiation. An increase of the cancer of the skin rate is thought to come as a consequence of this. Apart from this, danger by larger than normal concentrations of sulfur compounds and carbon dioxide in the atmosphere is foreseen. The global pollution by these components is difficult to measure because of the lack of measuring stations which are not influenced by nearby emission sources. The World Meteorological Organization has therefore set up guidelines for the selection of locations for stations measuring the global trends of air pollution. According to this, such measuring stations must be erected in the tundra, on ice, in the ocean, or in areas with extensive grassland or forests. The erection of ten CO2 measuring stations from Alaska, Hawaii, New Zealand, to Antarctica is planned.

24316 APTIC NO. 44322

Tokyo Metropolitan Environmental Protection Research Inst. (Japan)

PROGRESS REPORT ON INVESTIGATIONS CONCERNING THE FORMATION OF SMOG IN TOKYO AND DAMAGES ON PLANTS (REPORT NO. 2 ON INVESTIGATION OF TOKYO PHOTOCHEMICAL SMOG). *(Tokyo sumoggu seisei kijo shokubutsu higai ni kansuru chosa kenkyubukai chukan hokoku (Tokyo sumoggu ni kansuru chosa kenkyu danho)). Text in Japanese. 491p., 1972. 44 refs.*

A survey of known photochemical smogs in Tokyo and Los Angeles and detailed examinations of photochemical smog patterns in Tokyo were made. A meteorological examination and evaluation of smog measurement methods with regard to peroxyacetyl nitrate, hydrocarbons, formaldehyde, oxidant, ozone, nitrogen oxides, sulfuric acid ion, and nitric acid ion were also made. Photochemical smog was analyzed by field tests. Night smog, plant damage, and emission sources of Tokyo photochemical smogs were also studied. High oxidant concentrations of more than 0.15 ppm/hr occurred 47 times between May and December 1971, and 28,206 people complained of eye irritation and other discomforts. Seventy-one percent of the damages occurred 5 to 20 km inland from Tokyo Bay as in the cases of 1970, with few effects along the immediate shorelines. Oxidant concentration had a strong correlation with sulfur dioxide, nitrogen dioxide, and suspended particulates. No ozone was detected during the night smogs that occurred in winter of 1971. After various experiments, it was concluded that 18 to 19% of nitric oxide and 20 to 23% of nitrogen dioxide contributed toward oxidant formation.

24317 APTIC NO. 44128

Ashby, R. W., T. Shimazaki, and J. A. Weinman

THE EFFECT OF THE SST EXHAUST EMISSIONS ON THE CHEMICAL COMPOSITION OF THE STRATOSPHERE. *Preprint, American Meteorology Society, Boston, Mass., 29p., 1972. 52 refs. (Presented at the International Conference on Aerospace and Aeronautical Meteorology, 1st, Washington, D. C., May 22-26, 1972, Paper A 72-28801.)*

A model of the photochemical reactions in the stratosphere is described. The vertical distributions of 16 constituents of the stratosphere, in an oxygen-hydrogen-nitrogen oxide atmosphere, were calculated for the area between 10 and 50 km. This problem was solved by a nonequilibrium technique, which simultaneously solves the time-dependent continuity equations of all 16 constituents. The density profiles resulting from this model agreed reasonably well with the observed concentrations of several stratospheric constituents. The results of the model were then used as the starting point for the subsequent analysis. Excess nitric oxide and water were then added to the model to determine what effect these SST exhaust emissions would have on the other stratospheric constituents, especially ozone. Water had no effect on the ozone content, while NO reduced the total ozone concentration of the stratosphere by less than 1%. The model showed that the excess NO is chemically removed from the stratosphere, during the night, eventually being converted to nitric acid. Thus, it is less able to catalyze the destruction of ozone than previous models have suggested. (Author abstract modified)

24318 APTIC NO. 44277

Auermann, E., W. Fojt, and J. Janetzky

COMPARISON OF MEASURED AND CALCULATED FLUORINE EMISSION CONCENTRATIONS. *(Vergleich gemessener und berechneter Fluor-Immissionswerte). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 18(6):414-418, June 1972. 5 refs.*

The fluorine emissions of a source were measured at the stack and six measuring stations erected in all directions at distances of 200 to 650 m. For the emission measurements, samples were taken with a platinum probe. For the determination of the fluorine the method by Megregian was slightly modified and applied. The measuring accuracy was + or 15%. For determination of the emission concentrations, the air samples were drawn with a speed of 6 l/min through a heavily diluted sodium hydroxide solution (n/500). The concentration was determined by colorimetry. The temperatures at the measuring sites were between 6 and 8 C and 4 and 5 C. The winds from southwest to west had an average velocity of 4 m/sec 2 m above the ground. With the aid of the formulas by Bosanquet and Pearson, the fluorine concentrations were calculated and compared with the measured results. A good agreement between the two results was achieved. The background concentration was between 2 and 9 micrograms/cu m. Maximum concentrations (4.0, 9.0 and 5.3 micrograms/cu m) were measured in a distance of 290 m at an average wind speed of 6 m/sec. The emission concentrations were 45, 62, and 103 mg/cu m.

24319 APTIC NO. 43874

Belot, Y., C. Caput, G. Guyot, and C. Samie

LOCAL EFFECT OF A THIN WINDBREAK ON DISPERSION OF POLLUTANTS EMITTED AT GROUND LEVEL. *(Effet local d un brise-vent mince sur la dispersion des polluants emis au niveau du sol). Text in French. Ann. Agron., 23(2):123-143, 1972. 19 refs.*

Experimental tests were performed in the field to investigate the effects on a number of thin windbreaks of the turbulent diffusion of non-sedimental pollutants consisting of gas or particles emitted at ground level. During the test runs, fluorescent submicrons were emitted for 20 min from a pinpoint source located upstream of an artificial windbreak, the porosity and pressure drop of which had been ascertained. Concentrations at various points in space were determined by fluorometric analysis of the dusts taken from a system comprising 50 filters located at five different levels. The ranges of speeds and temperatures were concomitantly tested to determine the characteristics of flow. Under the experimental conditions of the tests, very pervious windbreaks have virtually no effect on diffusion of the particles. Whereas, if impervious, they cause the air to rise sharply with the cloud of particles, thereby bringing about the heaviest concentration at a height where pollutants are no longer harmful. These results were obtained in a strong wind, the vertical gradient of temperature being fully adiabatic and on rough terrain. Apparently, they cannot be extended to areas where different temperature conditions and mechanical turbulence effects are observed. (Author summary modified)

24320 APTIC NO. 44035

Benedetti-Michelangeli, G., F. Congeduti, and G. Fiocco

MEASUREMENT OF AEROSOL MOTION AND WIND VELOCITY IN THE LOWER TROPOSPHERE BY DOPPLER OPTICAL RADAR. *J. Atmospheric Sci., 29(5):906-910, July 1972. 5 refs.*

An optical radar was used to measure the radial wind velocity component in the lower troposphere by detecting interferometrically the bulk Doppler shift affecting the echoes from atmospheric aerosols. The measurements, carried out at night, basically utilized a highly coherent single frequency positively charged argon laser in the transmitter, a small telescope, a scanning spherical Fabry-Perot interferometer, and a photon counting system in the receiver. Data reduction was done by digital computer and involved independent examination of the spectral density curves of the reference and signal channels to obtain such monitoring parameters as the spectral width of the peaks and to ascertain possible malfunctions such as unstable laser behavior. After these preliminary analyses, data are cross correlated and the amount of spectral displacement that maximizes the correlation is taken as a measure of the radial wind velocity. (Author abstract modified)

24321 APTIC NO. 44356

Berman, C. and A. Goldburg

GLOBAL DISPERSION OF SUPERSONIC TRANSPORT EXHAUST IN THE STRATOSPHERE. *Preprint, American Meteorological Society, Boston, Mass., p. 194-197, 1972. 16 refs. (Presented at the International Conference on Aerospace and Aeronautical Meteorology, Washington, D. C., May 22-26, 1972.)*

A study was performed to estimate possible peak regional concentrations of supersonic transport-produced emissions in the stratosphere based on expected levels of SST flight operations. Calculations were made of the magnitude of peak concentrations. This value is presented graphically as a function of latitude for both spherical earth and for hemispherical earth (Northern Hemisphere). When the diffusion coefficient K equals two times 10 to the 9th power sq cm/sec, the factor for the regional peak value for the global dispersion of supersonic transport exhaust is the quotient of the peak emission concentration divided by the world average emission concentration, equalling 1.68. Interhemispheric mixing has only a slight effect on this value.

24322 APTIC NO. 43944

Bigg, E. K., Z. Kviz, and W. J. Thompson

AN OCTOBER INFLUX OF SUBMICRON PARTICLES INTO THE LOWER STRATOSPHERE. *J. Geophys. Res., 77(21):3916-3923, July 20, 1972. 11 refs.*

Although the concentration of particles in the stratosphere above the sulfate layer is typically 2-8 cu cm standard temperature and pressure, on three occasions over the United States and four over Australia, concentrations greater by at least two orders of magnitude were encountered. The particles have modal diameters of about 0.05 micron but are often joined together to form chains. In appearance and size distribution they closely resemble the particles obtained on some rocket flights at levels above 60 km. Phenomena that may be related and have been observed to occur at the same time of year (September through November) are stratospheric aerosol layers, which appear optically dense when they are viewed horizontally looking toward the sun, and some twilight striations. The origin of the particles has not been determined. (Author abstract)

24323 APTIC NO. 44570

Bockian, A. H. and M. A. Hostak

A COMPARISON OF FILTERABLE MASS AND LIGHT SCATTERING OF PHOTOCHEMICALLY PRODUCED AEROSOLS. *J. Colloid Interface Sci., 39(1):90-93, April 1972. 9 refs.*

Atmospheric studies previously conducted in Los Angeles indicated that the relationship between particulate concentration and prevailing visibility was an inverse power function and not a simple inverse linear function. Environmental chamber studies demonstrated that aerosols produced in an olefin-nitric oxide system produce a small filterable mass compared to that predicted from the amount of light scattering. The unusual mass-visibility equations derived from the atmospheric studies were plain. Atmospheric particulate concentrations determined by the filter method were inadequate indicators of visibility in locations where photochemical smog exists. (Author summary modified)

24324 APTIC NO. 43756

Carson, James E.

THE ATMOSPHERIC EFFECTS OF THERMAL DISCHARGES INTO A LARGE LAKE. *J. Air Pollution Control Assoc., 22(7):523-528, July 1972. 32 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 64th, Atlantic City, N. J., June 1971, Paper 71-58.)*

Concern for the biological and ecological effects of heated water has resulted in legal actions that will prevent power companies from dumping the waste heat from the majority of their new generating units into rivers and lakes. Many nuclear and fossil fueled plants now under construction are being required to change from once-through cooling systems to other methods, such as wet cooling towers, cooling ponds, and spray canals, despite higher costs and lower thermal efficiencies. Yet, these alternate cooling procedures also present environmental problems. The primary weather change due to once-through cooling on a large water body is a small local increase in fogginess at the plant outfall. However, the relative probability of significant local meteorological effects is much higher with the alternate cooling procedures, since these reduce the area of heat and moisture transfer. Therefore, from a meteorological point of view, once-through cooling on a large water body is to be preferred over cooling towers or cooling ponds. Because of the large heat capacity of the lake, this heat rejection procedure will not cause any significant changes in the weather and climate of the area.

24325 APTIC NO. 44389

Chow, C. F., E. C. Kindle, and F. M. Vukovich

STUDY OF ATMOSPHERIC BEHAVIOR USING A QUASI-GEOSTROPHIC, DIABATIC, TWO-LEVEL MODEL. *Monthly Weather Rev., 100(6):477-486, June 1972. 15 refs.*

A simple two-level model was used to explore the effect of diabetic heating in the atmosphere. Nontrivial solutions for the steady state condition were found only when diabatic heating was allowed. The steady state was characterized by a state of no motion and no growth or decay of energy for a particular wave number. The state of no motion was brought about by a balance between the Rossby motion and the motion produced by the divergence associated with the heating. The model was used to compute the heating required to account for the observed behavior of individual harmonic components in the atmosphere for the period January 10-14, 1966. The computed magnitudes and positions of the heating waves correlated well with previous results relating to this subject. (Author abstract)

24326 APTIC NO. 44030

Constance, John D.

SIMPLIFIED METHOD FOR DETERMINING INHALABLE CONTAMINANTS. *Pollut. Eng., 4(4)30-31, July 1972.*

An easy method is presented for estimating transient atmospheric contaminant concentration in in-plant atmospheres and processing enclosures. In an actual in-plant operation, the number of air changes needed to render an enclosure suitable for entry by plant personnel may be estimated using this method and graph. Threshold limit values for a number of vapors are listed, and two examples of the method are included. One pertains to sulfuryl fluoride and the other to methyl chloride concentrations. (Author abstract modified)

24327 APTIC NO. 44068

Coons, Frank G.

SOME PRELIMINARY RESULTS FROM THE FAA FOG DISPERSAL PROGRAM. *Preprint, American Meteorological Society, Boston, Mass., 9p., 1972. 4 refs. (Presented at the International Conference on Aerospace and Aeronautical Meteorology, 1st, Washington, D. C., May 22-26, 1972.)*

Airport fog dispersal goals, tested techniques for accomplishing these goals, and methods used for evaluating the effectiveness of the tested techniques are reviewed. A program for measurement and evaluation of the fog seeding activities at Seattle-Tacoma and Spokane International Airports is described. At Seattle Tacoma seeding was accomplished at altitude of less than 300 ft above ground level by injection of polyelectrolyte chemicals into the fog at rates less than 5 kg/nautical mile. At Spokane, where the fog type is primarily in the liquid state at temperature less than 0 deg celsius, the seeding operation was much the same, except that the seeding material was mainly crushed dry ice, occasionally mixed with unknown amounts of urea and polyelectrolytes. In addition to the continuous recording of runway visual range data at several locations, the following measurements were also performed on a continuous bases as part of the warm and cold fog seeding evaluation programs at the two airports: determination of lateral and vertical atmospheric diffusion coefficients and atmospheric stability; fog droplet size distribution and number density; chemical composition of the fog droplets; directional origin of fallout deposition; supplemental visibility measurement with laser transmissometers; electric field measurements using radioactive probe field meters; dew/frost point; and temperature. The aircraft served as platforms for aerial photography of the seeding operations. The photographs revealed the impact of aircraft wakes on fogs and low stratus.

24328 APTIC NO. 44472

Dana, M. T., J. M. Hales, and M. A. Wolf

NATURAL PRECIPITATION WASHOUT OF SULFUR DIOXIDE. *Battelle- Northwest, Richland, Wash., Atmospheric Sciences Section, Environmental Protection Agency APTD-1127, Rept. BNW-389, 160p., Feb. 1972. 30 refs.*

NTIS: PB 210968

Sulfur dioxide washout by precipitation from plumes of large, coal-fired power plants was investigated. Two washout models were developed. The first model, based on linear theory, provides a relationship for hand-calculated estimates of washout, provided that the implicit assumption of vertical rainfall is not violated significantly. The second model for nonlinear behavior is not restricted to vertical rainfall but necessitates computer calculation to predict washout values. The limiting behavior of the models, plume equations used in the calculations, and data analysis are examined. The washout of SO2 in an unpolluted atmosphere was also investigated, and support data were collected to relate the washout to atmospheric parameters. Data on rainfall rate, temperature, release height and rate, wind speed and direction, raindrop size distribution, pH, and turbulence parameters were determined. The SO2 concentrations and derived washout rates were compared with the washout models and their asymptotic limits. Irreversible washout was untenable. Observed washout rates fell close to those predicted on the basis of equilibrium behavior, with noted exceptions from experiments at short distances downwind from the source. Predictions from the nonlimiting washout models agreed well with the experiments, predicting that the observed proximity to equilibrium of SO2 in ground level rain results more from a decrease of plume concentration with height at ground level than from fast mass transfer responsiveness of the rain. The alternate theory of rapid absorption and desorption of SO2 by rain on the sampler collection surfaces was also considered. (Author summary modified)

24329 APTIC NO. 43989

Deardorff, James W.

PARAMETERIZATION OF THE PLANETARY BOUNDARY LAYER FOR USE IN GENERAL CIRCULATION MODELS. *Monthly Weather Rev., 100(2):93-106, Feb. 1972. 33 refs.*

Surface stress and fluxes of heat and moisture are parameterized for use in numerical models of the general circulation of the atmosphere. The parameterization is designed to be consistent with recent advances in knowledge of both the planetary boundary layer and the surface layer. A key quantity throughout is the height of the planetary boundary layer, which appears in the governing stability parameter, a bulk Richardson number. With upward heat flux, a time dependent prediction equation is proposed for the height that incorporates penetrative convection and vertical motion. Under stable conditions, the height is assumed to depart from the neutral value and to become nearly proportional to the Monin-Obukhov length. The roughness length is incorporated in the combination of height/roughness length, and the parameterization is consistent with height/roughness length affecting only the wind component in the direction of the surface velocity. The direction of the surface wind and stress is derived in a manner consistent with the known value of the surface pressure gradient and theoretical studies of the decrease of stress with height. The parameterization was tested numerically and appears to be efficient enough to use in existing general circulation models. (Author abstract modified)

24330 APTIC NO. 43921

Druyan, Leonard M.

OBJECTIVE ANALYSIS OF SEA-LEVEL WINDS AND PRESSURES DERIVED FROM SIMULATED OBSERVATIONS OF A SATELLITE RADAR-RADIOMETER AND ACTUAL CONVENTIONAL DATA. *J. Appl. Meteorol., 11(3):413-428, April 1972. 8 refs.*

A computer-based procedure was developed which combines a field of simulated satellite-derived wind speeds with a limited amount of conventional surface data to recover the surface pressure field and the vector wind field over the North Pacific Ocean. Wind speeds are determined from an objective analysis of high spatial density ship observations in order to simulate the anticipated output of a proposed satellite-mounted radar-radiometer system. Conventional surface data consist of sparse observations from ocean going vessels, observations from several tropical stations, and boundary pressures from analyses over coastal areas. Simulated speeds are combined with the conventional network for various spatial distributions of ship data. The average rms departure of sea level pressure fields analyzed by deleting from 75-94% of the available ship observations from the maximum data analysis is from 3.0-4.0 mb. Comparison of the wind components implied by the isobaric patterns to those of the withheld ship observations yields average rms differences of from 8.7-9.4 kt for a range of 75-94% data deletion. (Author abstract modified)

24331 APTIC NO. 43738

East, Conrad

SULFUR DIOXIDE EMISSIONS ESTIMATED FROM AIRBORNE MEASUREMENTS. *Atmos. Environ., 6(6):399-408, June 1972. 2 refs.*

A method is presented for obtaining information about the distribution, strength, and nature of some polluting sources in the absence of a complete inventory. The method consists of soundings set up along a vertical plane roughly oriented perpendicular to the general air flow. The soundings are performed by means of helicopter-borne equipment and the general air flow is estimated from wind measurements made at two meteorological towers. The method is illustrated by sulfur dioxide measurements made in the metropolitan area of Montreal, Canada. Electroconductivity and the West-Gaeke methods were used to measure the sulfur dioxide. (Author abstract)

24332 APTIC NO. 44280

Eriksen, Wolfgang

THE URBAN EFFECT ON PRECIPITATION. *(Zur Niederschlagsmodifikation im Bereich von Grossstaedten). Text in German. Staedtehygiene (Uelzen/Hamburg), 23(7):164-166, July 1972. 7 refs.*

Climatological studies of different cities in the world have shown apparent urban-produced increases in precipitation. Urban-induces nuclei concentrations, which are usually connected with urban thermal and mechanical effects, are probably sufficient to produce the observed changes, which very often cause severe problems for the drainage of towns. Comparative measurements in several large cities and rural areas revealed that the precipitation in cities was on the average 5 to 16% higher than in rural areas. In Chicago it was 5% higher, in St. Louis 7%, in Tulsa 8%, in Kiel 10%, in Moscow 11%, and in Bremen 16%. The maximum precipitation however, is not in the center of these cities, but on the leeward side of the main wind direction. The reason for the higher precipitation in cities is the emission of aerosols by industry and traffic which promote condensation. Aerological measurements have shown that large nuclei of more than 1 micron prevailed in the critical leeward side of Chicago-Gary. In Rochdale the nuclei concentration in the air was much lower on sunny days and in Leicester the smoke quantity as well as the sulfur dioxide concentration in the air above the city was considerably above the concentrations found in the countryside, particularly in the cooler season. City planners should therefore abstain from planning uninterrupted street fronts; the removal of all air pollution above the cities is urgently necessary.

24333 APTIC NO. 44339

Eschenroeder, A. Q., J. R. Martinez, and R. A. Nordsieck

A VIEW OF FUTURE PROBLEMS IN AIR POLLUTION MODELING. *General Research Corp., Santa Barbara, Calif., TM-1631, 48p., March 1972. 24 refs.*

Both fundamental and applied problems are surveyed for the near term outlook in photochemical modeling. The needs for phenomenology not yet incorporated in the models and systems implementation of the computer codes are discussed. Two of the phenomenological areas needing further examination are turbulent fluctuations and gas-surface effects as they interact with chemical rate processes. Each may lead to departures of calculated behavior from that actually occurring in the atmosphere. These problem areas are approached using interpretations of laboratory and atmospheric data. Some formalisms that must be added to the computer code are suggested to model or to simulate the effect. The neglect of heterogeneous processes in present day approaches omits possibly the most important cleanup processes for oxides of nitrogen. Corrections for turbulence effects on chemical rates may be needed in cases of large concentration fluctuations. The gas surface effects on model fidelity due to both urban surfaces and aerosol surfaces are classified and discussed. Regarding these interactions, some upper limit calculations of surface reactions show that further research must be directed toward measuring surface efficiencies for chemical reactions. Some model calculations are given and recommendations are presented for approaches to these problems. Systems analyses using air pollution models will require continual improvement of models by reducing the computer time needed. To optimize the tradeoffs between physical fidelity and computational efficiency, simulations can be considered which use approximations to the detailed solutions of the phenomenological equations. Task-oriented needs dictate the various levels of replication necessary. The LAPS program is described.

24334 APTIC NO. 43945

Fichtl, George H.

THIRD AND FOURTH MOMENTS OF VERTICAL TWO-POINT DIFFERENCES OF TURBULENT VELOCITY FLUCTUATIONS IN THE ATMOSPHERIC BOUNDARY LAYER. *Preprint, American Meteorological Society, Boston, Mass., p. 321-325, 1972. 8 refs. (Presented at the International Conference on Aerospace and Aeronautical Meteorology, 1st, Washington, D. C., May 22-26, 1972, Paper A72-28801 13-20.)*

The results of recent measurements of the distribution function of wind shear and the associated third and fourth standardized moments are presented. Emphasis was placed on the vertical variation of the longitudinal component of turbulence--the component of turbulence along the mean wind vector. The data source consists of 11 sets of longitudinal turbulent velocity fluctuation time histories digitized at 0.2 sec intervals with approximately 18,000 data points/history.

24335 APTIC NO. 43955

Fox, Douglas C.

NUMERICAL PROCEDURES FOR STUDYING INCOMPRESSIBLE TWO DIMENSIONAL TURBULENCE. *Preprint, American Inst. of Aeronautics and Astronautics, New York, 12p., 1972. 30 refs. (Presented at the American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 10th, San Diego, Calif., Jan. 17-19, 1972, Paper 72-152.)*

The nature of two-dimensional turbulence and its relevance to large scale motions in the atmosphere are reviewed. Numerical integrations of the discretized Navier-Stokes equations starting from a random initial field were obtained using Galerkin (Fourier) methods and compared with finite difference simulations. The Galerkin solutions are more accurate since differencing errors and aliasing errors are removed. Inviscid solutions of the discretized Navier-Stokes equations are shown to develop into a state of complete sharing between modes of energy and enstrophy (equipartition). This accuracy is illustrated in low Reynolds number solutions where the turbulence is correctly simulated. In cases where all the dissipation is not calculated, finite difference calculations produce equivalent results in a gross sense to the Galerkin method. (Author abstract modified)

24336 APTIC NO. 43988

Fox, Douglas G. and Douglas K. Lilly

NUMERICAL SIMULATION OF TURBULENT FLOWS. *Rev. Geophys. Space Physics, 10(1):51-72, Feb. 1972. 49 refs. (Presented at the Computer Simulation Conference, Summer, Boston, Mass., July 19-21, 1971.)*

Numerical simulation of turbulent flow is of practical importance in geophysics and is useful as a test of turbulence theory. Complete simulation is only practicable for two-dimensional or marginally turbulent three-dimensional flows. Some examples of such simulations are described. A more useful approach for practical applications is to directly simulate the larger scales of motion and only consider the small unresolved scales with respect to their gross statistical interactions with the larger scales. A variable eddy viscosity model was proved useful for this purpose, although better approximations can be devised. Methods of discretization and numerical integration are discussed. Galerkin methods are preferred when feasible in order to avoid truncation and aliasing errors. (Author abstract modified)

24337 APTIC NO. 44036

Galbally, I. and I. Allison

OZONE FLUXES OVER SNOW SURFACES. *J. Geophys. Res., 77(21):3946-3949, July 20, 1972. 8 refs.*

Ozone destruction at the earth's surface is one of the most important of the ozone sinks, an understanding of which is an essential part of a complete knowledge of the atmospheric ozone budget. The initial results of a program to investigate ozone destruction at snow surfaces are presented; these observations are the first of their kind. The measurements were made at Mt. Buller, Victoria. Vertical ozone differences were made with the modified Ehmert potassium iodide ozone sensor. Temperature and wind speed profiles were also measured, and the observations were recorded as 30-min means. Ozone fluxes are calculated from the vertical ozone differences under the assumption that the vertical eddy diffusivity for ozone is equal to that for momentum. The eddy diffusivity for momentum is derived from the wind profile measurements. Observations over old snow surfaces indicate an ozone difference that is less than the resolution of the instrument (0.20 times 10 to the 11th power molecules/cm to the negative 3rd power). These observations give an upper limit to the downward ozone flux of 8 times 10 to the 10th power molecules/cm to the negative 2nd power/sec., which is much slower than the destruction rate for a soil or vegetation surface. Observations over fresh snow surfaces showed a greater variability than those made over old snow surfaces. One explanation is that ozone may be absorbed on fresh snow without total destruction and may be released on the occasion of mechanical disturbance or a change in some critical parameter of the surface snow. The other explanation is that ozone is produced in blowing snow by static electricity, but this does not account for large downward ozone fluxes that were observed. The number of observations presented is small; however, it is interesting to note that the processes of ozone destruction at a snow surface are more complex than they were considered in the past, particularly for fresh snow surfaces. Further measurements are needed to prove or disprove the validity of the results.

24338 APTIC NO. 44209

Gamo, Minoru, Susumu Yamamoto, and Osayuki Yokoyama

AIRBORNE MEASUREMENT OF ATMOSPHERIC BOUNDARY LAYER STRUCTURE - ON THE AIRBORNE SENSOR SYSTEM. *(Hikoki ni yoru kyokaiso joho no ranryu kansoku - sono kansoku shisutemu ni tsuite). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 7(4):173-185, July 1972. 7 refs.*

The sensor system for the measurement of a turbulent flow in the boundary layer by an airplane equipped with various devices is described. The plane is equipped with a sonic anemometer thermometer for the measurement of the micro-change of wind at a vertical direction, horizontal vane for the micro-change of wind at a wind direction, hot-wire anemometer for the micro-change of wind at the flying direction, thermometers, and an apparatus for the correction of data caused by the motion of the plane. An analysis of the data obtained from a turbulent flow is given.

24339 APTIC NO. 43931

Glowacki, W. J. and S. W. Chi

EFFECT OF PRESSURE GRADIENT ON MIXING LENGTH FOR EQUILIBRIUM TURBULENT BOUNDARY LAYERS. *Preprint, American Inst. of Aeronautics and Astronautics, New York, 15p., 1972. 14 refs. (Presented at the American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 10th, San Diego, Calif., Jan. 17-19, 1972, Paper 72-213.)*

The eddy viscosity and mixing length distributions appropriate to a number of turbulent boundary layers were calculated by substituting experimentally measured velocity profile data into the governing equations expressing conservation of mass and momentum. Distributions were obtained for five incompressible, two-dimensional boundary layers which have constant values of the pressure gradient parameter; the pressure gradient parameter is defined as the boundary layer displacement thickness multiplied by the freestream pressure gradient and divided by shear stress at the wall. Such flows are referred to as equilibrium flows. The five equilibrium flows cover the range from moderate adverse pressure gradient to strong favorable pressure gradient. Where comparison is possible, the calculated distributions agree quite well with measured ones. The calculated results show that the mixing length representation is superior for equilibrium flows and that the gradient of the mixing length in the fully turbulent region varies with the equilibrium pressure gradient parameter. Results for a flow in which the pressure gradient parameter is changing rapidly show that the mixing length gradient lags significantly behind that expected on the basis of the local value of the pressure gradient parameter, reflecting the upstream flow history. Both the calculation procedure and the results for the six flows are presented and discussed. (Author abstract modified)

24340 APTIC NO. 44042

Gutman, Y.

A MODEL OF DIFFUSION IN A VALLEY FROM A CONTINUOUS POINT SOURCE. *Arch. Meteorol. Geophys. Bioklimatol. Ser. A (Vienna), 21(1):13-26, 1972. 5 refs.*

Diffusion in a valley was investigated, taking into account reflection and absorption from hillsides, at the ground and at an inversion layer. Given an arbitrary stationary concentration distribution F(x,y,z) from a continuous point source in free space, a general formula was derived for the concentration after full or partial reflection from the sides of a straight channel using a series of image sources. Specifying F(x,y,z) as a

Gaussian concentration distribution the model was used to obtain numerical estimates for diffusion in a valley from a continuous point source. Unlike the model valley, the sides of real valleys are sloping instead of vertical. The application of optical reflection laws is also a crude approximation. However, sloping sides and less effective reflection favor the main result of this study, that the influence of a valley on the concentration distribution from a point source is quite small to considerable distances and may be neglected close to the source. Once the influence on the maximum concentration becomes significant, the results show that the Gaussian cross wind distribution can change relatively quickly to a uniform distribution. However, this change may occur less rapidly in a real valley.

24341 APTIC NO. 43993

Hall, D. F. and W. C. Lyon

LOW THRUST PROPULSION SYSTEM EFFECTS ON COMMUNICATION SATELLITES. *Preprint, American Inst. of Aeronautics and Astronautics, New York, 10p., 1972. 50 refs. (Presented at the American Institute of Aeronautics and Astronautics, Communications Satellite Systems Conference, 4th, Washington, D. C., April 24-26, 1972, Paper 72-519.)*

Choice of type and placement of thrusters on communication spacecraft should include consideration of their effects on other subsystems. Models are presented on the exhaust plumes of mercury, cesium, colloid, hydrazine, ammonia, and Teflon rockets. Effects arising from plume impingement on spacecraft surfaces, radio frequency interference, optical interference, and earth environmental contamination are discussed. Some constraints arise in the placement of mercury, cesium, and Teflon thrusters. Few problems exist with other thruster types, nor is earth contamination a problem. (Author abstract modified)

24342 APTIC NO. 44162

Hayashi, M.

OBSERVATION OF THE VERTICAL PROFILES IN THE ATMOSPHERIC LAYER OVER THE SEA. *(Kenyu kikyu ni yoru kaijo teiso taiki no kansoku). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 7(2):95-104, March 1972. 6 refs.*

An experiment was conducted to clarify the vertical profiles of physical quantities which are related to the diffusion and transfer processes of material and energy in the atmospheric layer above the sea surface. Mean profiles of the wind speed, temperature, and humidity were measured by a wireless sonde. Fluctuations of the longitudinal, lateral, and vertical speed and temperature were measured by another sonde. These sondes were mounted on the cable of a captive blimp alternatively. Observations were carried out in the East-China sea, the warmest region in the northeast Pacific, and in the midst of the Kuroshio. Profiles above 100 m show no distinction from diurnal or place over the sea. The diffusion coefficient for momentum is obtained by a mean profile method. The coefficients have a tendency to decrease with an increase of height or Richardson number in this layer. (Author summary modified)

24343 APTIC NO. 44019

Hoffert, Martin I.

ATMOSPHERIC TRANSPORT, DISPERSION AND CHEMICAL REACTIONS IN AIR POLLUTION. A REVIEW. *Preprint, American Inst. of Aeronautics and Astronautics, New York, 16p., 1972. 69 refs. (Presented at the American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 10th, San Diego, Calif., Jan. 17-19, 1972, Paper 72-82.)*

Mathematical dispersion models which relate ambient pollution concentrations to emission and meteorological conditions are important tools in the rational planning of control strategies. A critical review is presented of techniques currently used or proposed for modeling concentration fields of particulates, sulfur dioxide, nitrogen oxides, carbon monoxide, hydrocarbons, and photochemical oxidants over air quality regions. Atmospheric boundary layer transport and stability, as well as chemical kinetics of the relevant species, are also discussed, insofar as they are physical factors in dispersion. The methods reviewed include the Gaussian plume and puff approximations, finite difference schemes, and homogeneously mixed box models. (Author abstract modified)

24344 APTIC NO. 44590

Holzworth, George C.

VERTICAL TEMPERATURE STRUCTURE DURING THE 1966 THANKSGIVING WEEK AIR POLLUTION EPISODE IN NEW YORK CITY. *Monthly Weather Rev., 100(6):445-450, June 1972. 14 refs.*

Time cross sections are presented of the vertical temperature structure during the 1966 Thanksgiving week air pollution episode in New York City, based on 6-hourly soundings at Kennedy Airport. The analyses depict numerous inversions in the lower 10,000 ft of the atmosphere, including an interesting sequence of surface based inversions and an outstanding inversion aloft. Diurnal and daily variations in the height of the mixing layer can also be seen. Some possible influences of the vertical temperature structure on sulfur dioxide concentrations in Manhattan are discussed, and it is suggested that exceptional peak SO2 concentrations were largely due to the fumigation process. (Author abstract)

24345 APTIC NO. 43823

Jonas, P. R. and J. I. Bartlett

THE NUMERICAL SIMULATION OF PARTICLE MOTION IN A HOMOGENEOUS FIELD OF TURBULENCE. *J. Comput. Phys., 9(2):290-302, April 1972. 14 refs.*

A simple method of simulating the velocity of a particle moving in a field of uniform homogeneous turbulence involving only the generation of a set of random numbers with a Gaussian distribution has been established. The turbulence is approximated by a Brownian motion Markov process, and the scales of motion are assumed to lie in the inertial subrange. The velocities calculated using this method are consistent with the assumptions made about the turbulence. An application of the model has been made to the problem of droplet growth in turbulent clouds. (Author abstract modified)

24346 APTIC NO. 43727

Kogaya, Yozo and Kimio Nakamura

STUDIES ON AIR POLLUTION AND METEOROLOGICAL PHENOMENA. I. ANALYSIS OF SO2 HIGH CONCENTRATION IN KEIYO COASTAL INDUSTRIAL AREA FROM THE VIEWPOINT OF WEATHER MAPS. *(Taiki osen to kisho ni kansuru kenkyu (daiippo), kiatsu haichi yori mita keiyo rinko kogyo chitai no SO2 konodo osen kaiseki). Text in Japanese. Eisei Kagaku (J. Hyg. Chem.), 18(1):27-34, 1972. 3 refs.*

The area of the Keiyo coastal industrial development program stretches over 76 km along Tokyo Bay from the coast of Urayasu on the north to the cape of Futtsu on the south. The area to be reclaimed by 1985 is expected to cover 14,123 ha. To maintain the environment in good condition, by preventing air pollution by the activities of the plants in this Keiyo industrial area, sulfur dioxide concentration was measured at 24 monitoring stations, and the relationship between weather map type and high-level SO2 concentration in this area was examined. From the results of this investigation, the following points were clarified. High SO2 concentration occurred during high, rather than low, atmospheric pressure. The frequency of high SO2 concentration at more than 10 monitoring stations, according to the atmospheric pressure pattern, was found 52 times, the majority being in H2 and H5 types. With respect to the high SO2 concentration areas of H2 and H5 types, H2 type was the highest in Ichihara area during 11:00 am and 2:00 pm and low at night, but comparatively high all day in the Funabashi and Chiba area, probably due to the land and sea breeze. High concentration of the H5 type (summer) was found to occur along the coast from Hamano to Iwasaki. The state of contamination by hourly variations in high SO2 concentration can be seen in two areas of Ichihara and Chiba. (Author abstract modified)

24347 APTIC NO. 44075

Klenke, Werner

COOLING BY MEANS OF WATER AND AIR. (Kuehlung mit Wasser und Luft) Text in German. *Tech. Umwelt-mag., no. 3:31-32, June 1972.*

The waste heat from industry is emitted into the environment by several cooling methods using air and water as the cooling agent. Direct cooling with water and air and indirect cooling with air under an open cooling water circulation system take ambient air, heat it, and enrich it with water in the cooling device of the power generating plant. In a wet cooling tower, the air is heated by 10 K and absorbs about 10 g of water/kg air. This cooling system causes the formation of mist and ice and pollutes the air by the emission of water. The direct dry cooling with air and the indirect dry cooling with air using a closed cooling water circulation system heat the air by 15 to 20 K and influence meteorological processes.

24348 APTIC NO. 43772

Leahey, Douglas M.

AN ADVECTIVE MODEL FOR PREDICTING AIR POLLUTION WITHIN AN URBAN HEAT ISLAND WITH APPLICATIONS TO NEW YORK CITY. *J. Air Pollution Control Assoc., 22(7):548-550, July 1972. 5 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 62nd, New York, N. Y., June 1969, Paper 69-107.)*

A simple advective urban air pollution model, which is nondiffusive and relies primarily upon conservation of mass, was tested for the New York City area. Predicted values of sulfur dioxide mixing ratio were compared with over 400 observations made on five different mornings. The correlation coefficient between observed and predicted pollution concentrations was 0.85 and the standard error of estimate was 0.13 ppm. As the Metropolitan New York area is a large, nearly uniform source of pollution, simple advection might be sufficient to explain the observed pollutant concentrations. However, modification by diffusion processes will become more important as the air's travel time downwind of a city lengthens. (Author conclusions modified)

24349 APTIC NO. 43952

Lin, Shih-Chun and Shao-Chi Lin

A STUDY OF A HOMOGENEOUS COMPRESSIBLE TURBULENCE FIELD GENERATED BY RAPID MIXING OF HOT AND COLD STREAMS. *Preprint, American Institute of Aeronautics and Astronautics, New York, 9p., 1972. 17 refs. (Presented at the American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 10th, San Diego, Calif., Jan. 17-19, 1972, Paper 72-119.)*

A nearly homogeneous turbulence field with large amplitude temperature and density fluctuations was generated in a subsonic wind tunnel by rapid mixing of 64 hot and cold air streams behind a specially constructed grid. Electrical heating power up to 300 kW was used to generate initial temperature ratios up to about 1.5 at a mean velocity of 11 m/sec. Constant temperature and fine wired resistance thermometer probes were used to measure the velocity and temperature fluctuations simultaneously. Preliminary results are presented on temperature fluctuation intensity, power spectrum, and other statistical quantities such as skewness and kurtosis. The root-mean-square temperature fluctuation remains as high as 10 C at 34 grid spacings downstream of the grid, while the mean absolute temperature reaches 370 K at the highest heating rate. Even at a relatively low grid Reynolds number of 45,000, an inertial subrange in the temperature fluctuation spectrum was observed. The decay of temperature spectral value is more rapid at the lower wave numbers. Both the skewness and the kurtosis of the temperature distribution and of its derivative distribution show an initial spottiness of the temperature field. However, homogeneity is established after about 40 grid spacings. Normalized temperature spectra still show a universal form when proper local fluid properties and cold flow energy dissipation rate are used. A scheme to extract velocity field information from the mixed hot wire output is sketched. (Author abstract modified)

24350 APTIC NO. 44393

Lowe, R. P. and D. McKinnon

MEASUREMENTS OF STRATOSPHERIC METHANE OVER NORTH AMERICA. *Can. J. Phys., 50(7):668-673, April 1, 1972. 25 refs.*

The absorption due to the epsilon 3 band of methane in solar spectra was used to deduce the methane content of the lower stratosphere. The spectra were taken from an aircraft flying at altitudes between 10 and 18 km and at latitudes from 18 deg to 66 deg N. Methane was found to be uniformly mixed up to 25 km with an average mixing ratio of 0.94 plus or minus 0.16 ppmv. No large latitudinal variation of the mixing ratio was observed. Uniform mixing of methane to 25 km as observed here is not inconsistent with previous results which indicate that methane should be destroyed in the lower stratosphere by reaction with singlet oxygen atoms formed in the photodissociation of ozone, if methane is contributing to the increase in water vapor concentration above 25 km. (Author abstract modified)

24351 APTIC NO. 43855

Malte, P. C. and J. A. Nicholls

INFRARED DETECTION OF HF TRACER GAS IN INERT AND COMBUSTING FLOWS. *Preprint, American Inst. of Aeronautics and Astronautics, New York, 17p., 1972. 26 refs. (Presented at the American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 10th, San Diego, Calif., Jan. 17-19, 1972, Paper 72-70.)*

A noninterfering diagnostic technique that employs monomeric hydrogen fluoride as a passive tracer gas was developed. Infrared absorption by HF is used to infer turbulent mixing rates in inert and combusting flows. Data are presented on the turbulent diffusion of HF seeded streams of air, heated air, hydrogen, and carbon dioxide into an outer coaxial air stream. Combustion of acetylene and air in a free jet configuration was also investigated with the HF tracer. In most of these flow situations, the HF exhibited apparent rotational nonequilibrium. Development of the experimental technique and methods for data acquisition and analysis are discussed. (Author abstract modified)

24352 APTIC NO. 44399

Meyer, Edwin L., Jr. and Jimmie E. Quon

A METHOD OF SIMULATING WIND CONDITIONS DURING ATMOSPHERIC STAGNATION PERIODS. *J. Appl. Meteorol., 11(5):800-805, Aug. 1972. 9 refs.*

A method is presented for simulating meteorological conditions encountered during air pollution episodes. Meteorological conditions are expressed in terms of atmospheric stability, mixing depth, surface temperature, present wind direction, present wind speed, and wind direction and speed variability. Realistic conditions are obtained by varying stability, mixing depth, and surface temperature diurnally in accordance with patterns observed during past episodes. Wind direction and speed are determined by using a digital computer to generate values from empirical frequency distributions and random number generator routines. Once an initial wind direction and speed are selected, subsequent directions are obtained by generating wind direction changes from wind direction variability frequency distributions and adding these changes to former values. Wind speeds are generated from conditional frequency distributions appropriate for each wind direction. Comparison of computer-generated and observed wind directions and speeds failed to reveal any significant statistical differences. Generating wind conditions stochastically from empirical frequency distributions provides one with greater flexibility in testing the effectiveness of hypothetical air pollution control strategies during emergencies. Repeated simulations of wind conditions in this manner, when used as meteorological input to a dispersion model, may provide aid in evaluating different control strategies. (Author abstract modified)

24353 APTIC NO. 44212

Mizuno, Tateki, Hisao Hattori, and Mitsuaki Ino

THE STATISTICAL APPROACH TO THE RELATION BETWEEN SO2 CONCENTRATION AND WIND. *(Tokei shori kekka kara mita io sankabutsu nodo to kaze no kankei). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 7(4):186-195, July 1972.*

A computer program for the statistical analysis of sulfur dioxide concentration and wind data obtained at monitoring stations is described, and examples of application are given. More than 8400 data are obtained from two monitoring stations at the south bank of Muroran city, and the relation between the SO2 concentration and the meteorological conditions are analyzed. Results show that the pollution of the area is a rapid-wind type, and the winds are mostly from west-northwest and easterly directions, especially in winter. High pollution is usually found at wind velocity of 3 to 6 m/sec when a west-northwest is blowing, and the pollution increases as the velocity of wind from northwest increases. It is also found that the atmospheric layer is more stable when wind from northwest is blowing.

24354 APTIC NO. 43828

Muir, M. S.

ELECTRIC SPACE CHARGE IN THE ATMOSPHERE. *J. Atmospheric Terrest. Phys., 34(5):941-946, May 1972. 7 refs.*

The use of field mills to measure space charge density is a suitable method for investigation of the electrical nature of the atmosphere where charge densities of 20 pC/cu m and more are of interest. One major advantage of this method over filtration methods is that continuous records may be obtained under almost all weather conditions. The major disadvantage is the lack of sensitivity to space charge variations which are smaller than 20 pC/cu m. Space charge densities of large magnitude may exist, particularly within 2 m of the earth. Concentrations of space charge density may persist in spite of apparently good conditions of atmospheric mixing, and the resultant effect on field mill calibration is important. Results due to the melting of snow and the presence of artificial sources of space charge are discussed.

24355 APTIC NO. 44350

Saito, Haruo, Masataka Hayafuku, Tomio Hirono, Norio Ito, Sumio Izumikawa, Kunihiko Asakino, Kinji Nakano, Toshio Ohira, and Hiroshi Yamazaki

ANALYSIS OF TRANSFERRING MECHANISM OF SULFUR DIOXIDE FROM THE VIEW-POINT OF THREE DIMENSIONAL CONSTITUTION OF WIND LAYER. *(Fuso no Rittaikozo kara mita Aryusangasu Yuso kiko no kaiseki). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), no. 3: 17-26, March 1972.*

The atmospheric current was determined in order to clarify the phenomena of air pollution. Considering topography and urban construction of Tokyo City, diffusion of pollutants from industrial areas was studied. Non-lift balloons were discharged 152 m above the ground in Hamamatsu-cho, and they were followed by helicopters. The vertical distribution of the wind was measured within the range of 2000 m above the ground by pilot balloons. The vertical distribution of upper air temperature within the range of 1000 by helicopters, and the wind over the ground were determined. Around the Baiu front, there were violet ascending and descending air currents. The exhausted smoke from high stacks took courses of flow unexpected from line figures of the wind flow over the ground. The descending air current corresponded closely to high concentration areas of SO2. Even in the uniform sphere of sea breezes, ascending and descending air currents mixed with each other enormously at the heart of Tokyo City. Even under the control of prevailing winds on a weather chart, there was a converging bundle of local wind zones in the western part of Tokyo, owing to the existence of a cyclone above the Sea of Japan.

24356 APTIC NO. 44235

Osipov, Yu. S.

THE RELATIONSHIP OF TRANSVERSE SCATTERING OF AN ADMIXTURE IN THE ATMOSPHERIC SURFACE LAYER WITH CHARACTERISTICS OF TURBULENCE. *(Svyaz' poperechnogo rasseyaniya primesi v prizemnom sloye atomosfery s kharakteristikami turbulentnosti). Text in Russian. Meteorol. i Gidrol., no. 6:42-50, 1972. 16 refs.*

An analysis of a series of diffusion experiments was performed from a low point source (2 m above the earth surface) over a plane and homogeneous underlying surface. Simultaneously with the diffusion experiment, a complex of meteorological observations in the lower 4 m atmospheric layer was conducted. From these observational data, characteristics of the turbulent regime were determined using the similarity theory. The comparison of the turbulent characteristics with diffusion data demonstrated a possibility of applying the relations derived on the basis of the statistcal theory of turbulent diffusion for calculating the transverse diffusion of an admixture. Values were obtained for the constant which gives the relation of the kinetic energy of the transverse component of wind velocity with the dynamical friction velocity. Obtained values of the constant are in good agreement with data of other authors. (Author abstract modified)

24357 APTIC NO. 44085

Peck, Edson R. and Kaye Reeder

DISPERSION OF AIR. *J. Opt. Soc. Am., 62(8):958-962, Aug. 1972. 7 refs.*

New measurements of the infrared dispersion of air are reported, which agree with series I of the 1962 data of Peck and Khanna, but lie below Edlen's 1966 formula. The new data are measurements of the refractivity index for air in the infrared, made using the corner-cube interferometer, read-out equipment, and a previously described method. A two-term Sellmeier formula suffices to fit resulting infrared data as well as the data selected by Edlen in the visible and ultraviolet, being valid down to nearly 0.23 micron. Other possible Sellmeier fits are discussed, including extension to 0.185 micron. (Author abstract modified)

24358 APTIC NO. 44173

Plass, Gilbert N.

RELATIONSHIP BETWEEN ATMOSPHERIC CARBON DIOXIDE AMOUNT AND PROPERTIES OF THE SEA. *Environ. Sci. Technol., 6(8):736-740, Aug. 1972. 13 refs.*

The variation of atmospheric carbon dioxide amount with the properties of the sea is obtained from numerical solution of the equilibrium equations. Solutions are given for the following conditions: when there is insufficient time for equilibrium with calcium carbonate deposits or the clay sediments, when there is sufficient time for equilibrium with the calcium carbonate deposits, but not with the clay sediments, and when the time is sufficiently long for equilibrium with both calcium carbonate deposits and the clay sediments. The variation of the partial pressure of the atmospheric CO2 is a function of the total CO2 in the sea and atmosphere, the mean temperature of the sea, and the volume of the sea. The implications for theories of climatic change are discussed. (Author abstract modified)

24359 APTIC NO. 43735

Ratner, Michael I. and James C. G. Walker

ATMOSPHERIC OZONE AND THE HISTORY OF LIFE. *J. Atmospheric Sci., 29(5):803-808, July 1972. 38 refs.*

Biological evolution, in its early stages, may have been constrained by the solar ultraviolet radiation that would have penetrated to the ground if the atmosphere at this time contained little or no oxygen and therefore little or no ozone. In order to provide a more quantitative basis for the examination of this possibility, a simple photochemical model was used to evaluate ozone densities in atmospheres resembling the present atmosphere in most respects, but containing less oxygen. As the amount of oxygen in the atmosphere is reduced, the ozone column density initially increases. Only when the amount of oxygen in the atmosphere falls below .10 of its present level does the ozone column density begin to decrease. Very little atmospheric oxygen (possibly .001 of the present amount) is required to produce a biologically effective ozone screen. (Author abstract modified)

24360 APTIC NO. 43788

Reiter, Reinhold

STRATOSPHERIC AIR BREAKS THROUGH TO THE EARTH'S ATMOSPHERE. *(Stratosphaerenluft bricht zur Erdoberflaeche durch). Text in German. Umschau (Berlin), 72(13):429-431, July 1972. 2 refs.*

Stratospheric air carries trace gases and aerosols from volcanic eruptions or supersonic airplanes; it may be polluted by radioactive matter and it usually carries a high ozone concentration. To predict the arrival of air masses with stratospheric character on the earth's surface, an accurate knowledge of the processes is necessary. For this purpose a.s.l. membrane filters are exposed to 2000 cu m of air/day in an altitude of 3000 m. The radionuclides phosphorus-32, sulfur-35, beryllium-7, and some heavy metals of fallout are extracted from the filters. The daily fluctuations in concentration of these radionuclides are closely related to the meteorological conditions in the tropopause layer. An injection of stratospheric air can be easily detected. The trajectories of the contaminated stratospheric air masses in the troposphere are calculated. (Author summary modified)

24361 APTIC NO. 44324

Rosinski, J. and C. T. Nagamoto

WATER-AFFECTED FRACTION OF NATURAL 1.5-9 MICRON DIAMETER AEROSOL PARTICLES. *J. Colloid Interface Sci., 40(1):116-120, July 1972. 2 refs.*

The water-affected fraction of aerosol particles for several natural aerosols was determined (by number) using two techniques. The first technique was based on sampling two parallel air streams at a constant flow rate with a Royco counter and a Coulter counter, respectively. The second technique consisted of sampling 2.5 cu m of air through a membrane filter and then washing the filter with particle-free water. Counting and sizing of particles before and after washing gave the water-affected fraction of aerosol particles. The contact time between particles and water was 30 min. Two processes took place: dissolution of soluble particles and soluble binding materials, and the formation of particles through the mechanical disintegration of aggregates. The water-affected fraction of a given size class of an aerosol population reflects the change in particle concentration when that population becomes hydrosolized. The largest change was observed in the 1.5-3 micron particles in a polluted atmosphere, especially in the presence of scattered rain and overcast sky. The aggregates formed through evaporation of cloud droplets seem to be the principal source of smaller hydrosol particles. Aerosols in air parcels of different origin (maritime and continental aerosols) have entirely different values of water-affected fraction. Parallel determination of changes in air concentration of chloride particles and water-affected fraction of aerosol particles, coupled with analysis of air parcel trajectories, showed excellent agreement in identification of the movement of maritime air parcels over the central part of the continent (Colorado). The relationship between the concentration of different sized natural aerosol particles entering a storm and the fraction which is transferred into precipitation is extremely complex; it cannot be deduced from the mere determination of concentrations of aerosol particles and hydrosol particles found in liquid or solid phases of precipitation, but its determination should include knowledge of the water-affected fraction of aerosol particles over the entire size range. (Author abstract modified)

24362 APTIC NO. 43842

Simons, T. J.

ON THE THEORY OF ATMOSPHERIC DEVELOPMENT. *Monthly Weather Rev., 100(2):145-152, Feb. 1972. 12 refs.*

The baroclinic instability problem was formulated as an initial value problem to evaluate the effects of the initial configuration of the wave perturbation. The vertical shape of the initial perturbations were found to be as important as their wavelength in determining the energy conversions during the early stages of their development. The general character of the solution of the initial value problem was compared with normal mode studies of baroclinic instability. It was concluded that the initial value formulation bridges the gap between hydrodynamic stability theory and synoptic studies of cyclone development in the atmosphere. (Author abstract)

24363 APTIC NO. 43699

Staley, D. O. and G. M. Jurica

EFFECTIVE ATMOSPHERIC EMISSIVITY UNDER CLEAR SKIES. *J. Appl. Meteorol., 11(2):349-356, March 1972. 20 refs.*

Calculations of the effective atmospheric emissivity for clear skies and straight temperature and dew-point surroundings were made by means of emissivity integrations. Previously established emissivity data were used, and separate computations were made for water, carbon dioxide, H20-CO2 overlap, and ozone. The effective atmospheric emissivity depends almost entirely on surface vapor pressure, decreases slightly with increasing surface elevation, and is essentially independent of surface temperature. The contribution by CO2 decreases from about 0.19 to about 0.17 as surface elevation increases from sea level to 710mb. The contribution of overlap is negative and increases rapidly with increasing surface vapor pressure, becoming comparable to the CO2 contribution for very large vapor pressures. Measurements support the computations, but suggest additional downward flux density from aerosols or from, as yet, unspecified trace gases. (Author abstract modified)

24364 APTIC NO. 43829

Styro, B. I., G. G. Okroashvili, and T. G. Khudjua

ON THE DETERMINATION OF DISTRIBUTION-DENSITY OF THE TURBULENT DIFFUSION COEFFICIENT FOR THE LOWER HALF OF THE TROPOSPHERE. *(K voprosu ob opredelenii plotnosti raspredeleniya koef-*

fitsienta turbulentnoy diffuzii dlya nizhney poloviny troposfery). Text in Russian. Soobshch. Akad. Nauk Gruz. SSR, 65(2):305-307, 1972. 2 refs.

The density function of the coefficient of vertical turbulence diffusion was determined, assuming a random character for the changes this coefficient undergoes. The density function reflects a fairly close approximation of the layered structuure of the atmosphere. It is derived from radiometric atmosphere-probe data processed with the aid of a digital computer.

24365 APTIC NO. 43891

Trombetti, F. di and O. Vittori

ATMOSPHERIC POLLUTION IN THE INFRARED SPECTRUM RANGE. *(L atmosfera inquinata nello spettro infrarosso). Text in Italian. Riv. Ital. Geofis., 21(1-2):63-72, April 1972. 27 refs.*

The possible effects of human activity on the planetary albedo and the net flux of radiation sent out to space are discussed, and a detailed survey of the band models assumed for calculating the incoming flux of an atmosphere emitting and absorbing selectively, using normal radiosounding data, is presented. The validity of an empirical formula is discussed on the basis of incoming fluxes calculated from Milano soundings. The role played by atmospheric particles and by the wings of the far bands on the emission and absorption of radiation in the atmospheric windows are also discussed. On this basis, results of spectroscopic examinations of the infrared spectrum of the sun, performed in the laboratory, are described. It is concluded that water droplets grown around atmospheric particles in a sub-saturated atmosphere may play an important role in the emission and absorption of radiation in the infrared windows of the atmosphere. (Author summary modified)

24366 APTIC NO. 44458

Westlin, Peter R., David L. Brenchley, and Phillip J. Smith

AN EMPIRICAL STUDY OF THE LENGTH OF COOLING TOWER PLUMES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 19p., 1972. 6 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 65th, Miami, Fla., June 18-22, 1972, Paper 72-133.)*

An empirical study of the plumes from an induced draft cooling tower was undertaken, and predictions of the plume length equations presented by Baker and Smith and Agee were compared with experimental data. Meteorological measurements of ambient temperature, relative humidity, wind speed, and ambient pressure were conducted. Stack exit gas temperature was measured and the gas exit flow rate was estimated from fan ratings. These parameters were required for the two prediction equations. The plume lengths measured were determined using the single camera procedure described by Halitsky. All experimental data were collected during the early morning, since this proved to be the time of greatest fogging potential. A two way analysis of variance comparison showed that the Baker equation was not suitable for predicting the lengths of induced draft cooling tower plumes. The Smith and Agee equation was accurate at a 95% confidence level for predicting the average of all the experimental data, but could not be depended on to estimate correctly the length of a cooling tower plume under any given condition. Two new plume length equations were developed from the experimental data. Regression techniques were used to determine an equation for plume length during wind speeds less than 1 m/sec, since relatively large plumes were measured during such periods. The Gaussian plume model as presented by Turner was used in developing a plume length equation for wind speeds greater than 1 m/sec. Both cases show excellent correlation with experimental data with multiple regression coefficients greater than 0.8. (Author abstract modified)

24367 APTIC NO. 44365

Yamamoto, Susumu and Osayuki Yokoyama

THE EFFECTS OF WIND SHEAR ON THE DIFFUSION IN THE EKMAN LAYER. *(Ekuman-so ni okeru kemuri no kakusan). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 7(4):153-159, July 1972. 9 refs.*

The effects of wind shear on diffusion are considered qualitatively by using the profiles of wind velocity and diffusion coefficient in the Ekman layer for stable, neutral, and unstable conditions. The distribution of concentration is computed from differential equations applicable to the diffusion and the results are compared with some experimental data. It is observed that shearing effects increase at greater leeward and cross wind distances, that shearing effects are particularly important for stable and neutral conditions, that the lateral-vertical cross section of the plume is shaped like a pear, and that the results of the computations are consistent with the experimental data.

24368 APTIC NO. 44088

Yokoyama, Nagayuki

DIFFUSION OF ATMOSPHERIC POLLUTANTS. *(Taiki osenshitsu no kakusan). Text in Japanese. Sekiyu Gakkai shi (J. Japan Petroleum Inst., Tokyo), 15(7):573-577, July 1972. 14 refs.*

Formulas for calculating the atmospheric diffusion characteristics i.e., turbulent diffusion, of smoke and similar air pollutants are discussed. There are two approaches to turbulent diffusion: the statistic theory and the transport theory. In the statistic theory, the irregular movement of the turbulence is analyzed statistically to obtain the diffusion width as well as the diffusion factor of smoke. In this connection, the formulas developed by Taylor to express the atmospheric diffusion of particles in certain types of turbulence are introduced. The diffusion width in turbulent diffusion first increases in proportion to time and then, after a certain period of time (tl) has elapsed, to a square root of the time. The diffusion factor increases similarly in the earlier stage but levels off in the later stage. Atmospheric diffusion in the horizontal direction is affected by the turbulences of a long-cycle fluctuation, so that the diffusion width changes with S (standardization time). The diffusion phenomena are affected by tl, T (diffusion time) and S. Reports discussing the correlation of the three factors are cited, as are studies of vertical diffusion. In the transport theory, turbulent diffusion is dealt with by means of differential equations applicable to diffusion similar to molecular diffusion. Diffusion formulas established in this connection are presented including the Sutton formula. Experimental studies of the atmospheric diffusion are also discussed.

24369 APTIC NO. 44211

Yokoyama, Nagayuki

ATMOSPHERIC DIFFUSION MODELS AS A COUNTERMEASURE FOR AIR POLLUTION. *(Taiki osen no seigyo to kakusan moderu). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 7(4):125-133, July 1972. 13 refs.*

Diffusion models for air pollution study including wind tunnel, water path, cage type, plume, and puff models are described. Among all the models developed for instantaneous prediction, physical processes, including cage type, plume model, and puff model, are possible for increases in the prediction accuracy. Factors important for improving the prediction accuracy are, a method for catching the pollution sources, an accurate method for predicting the diffusion width and the effective stack height, and a quantitative method for the determination of precipitation, rain washing, and degeneration. For developing these, a thorough investigation by tracer experiment, a micro-meteorological survey, a source survey, and the measurement of the structure of the diffusion field is necessary.

BASIC SCIENCE AND TECHNOLOGY

24370 APTIC NO. 43797

COMBUSTION MECHANISM OF SULFUR. *(Iwo no nensho kiko). Text in Japanese. Ryusan (J. Sulfuric Acid Assoc., Japan), 25(5):150-154, May 1972. 27 refs.*

A literature review of the combustion mechanism of sulfur is presented. In the study made by Sarkisyan and others using electron-spin resonance (ESR), a mixture of sulfur vapor and helium was reacted with molecular oxygen of 3 mm Hg pressure at 300-400 F to measure SO radicals. As a result, the number of oxygen atoms was determined to be 10 to the 15th power/cu m and that of SO radicals, 10 to the 13th power/cu m. Diev and others in an other study, concluded that SO, taken as an intermediate product of sulfur oxidation, is important in relation to the reaction velocity. Radford's study using ESR is also quoted in this connection. The mass spectrum of the reaction between sulfur and atomic oxygen was measured by Liuti and others. Schenk's work on chemistry of low oxides of sulfur (SO, S2O and S3O) is also quoted to explain the presence of SO radicals at 1250-1500 C. The disappearance or reaction of SO in a sulfur flame takes place when SO meets with atomic oxygen. The reaction formulas developed by Rolfes and others are presented. The reaction of SO with molecular oxygen as made by Merryman and Levy was formulated. With regard to the oxidation of sulfur dioxide, Pankhurst's table of the equilibrium constant on the SO2-SO3 reaction was quoted. To explain the fact that concentration of sulfur trioxide in the boiler stack gas is actually greater than that calculated by the equilibrium theory, Whittingham and Dooley formulated some new reaction mechanisms. The studies made in this field by Cullis, Gaydon, Levy, and many others are cited. The effects of impurities on the sulfur flame and spectrometric researches on the subject are also described.

24371 APTIC NO. 43894

HYBRID GAS GENERATOR MAKES AIR BAG SYSTEMS SMALLER, LIGHTER, QUIETER. *J. Automotive Eng., 80(2):57, 59, Feb. 1972.*

The Allied Chemical Corp. in Mount Clemens, Mich. has demonstrated an air bag system based on an improved hybrid gas generator. An unnamed gas which produces very few toxic products is used as the compressed gas. The powder charge used is much smaller than the cylinder necessary to store an equivalent amount of gas under pressure. By using stored gas for only 25% of inflation, Allied cuts effective cylinder volume from 166 to 60 cu in. Also, reduced storage pressure simplifies filling and sealing. Loudness in the 0.3-20 kHz region has been cut by 10-15 db. Besides reducing size, hybrid construction offers a way to control inflation rates. For example, in a mild accident, it might be desirable to inflate bags more slowly than in a worse case. For slow inflation, appropriate sensors and logic circuits could light off the powder charge some short interval after firing the squib. Stored gas would start unfolding the bag, followed by full inflation from the gas generator. Thus, deployment speed, average internal pressure, and noise level would be lower. Alternatively, hard impacts would fire both initiators simultaneously. Two types of crash sensors which were mentioned by Allied are described.

24372 APTIC NO. 44143

Acharya, R., B. Ecanow, and R. Balagot

COACERVATE FORMATION BY AEROSOL OT WITH SODIUM CHLORIDE. *J. Colloid Interface Sci., 40(1):125-126, July 1972. 2 refs.*

Findings are presented on the physical properties of sodium di(2-ethylhexyl)sulfo acetate (Aerosol OT), sodium chloride, and water coacervate systems. The required quantities of sodium chloride were added to dispersions of Aerosol OT in distilled water. Within a few minutes oil like droplets began to separate and settle. The phase separation was allowed to proceed until there was no further changes in the volumes of the two liquid phases. The concentration of Aerosol OT in each phase was determined by ultraviolet absorbance at 215 nm. In another series, the salt concentration was kept constant at 2.5% in all the systems. Aerosol OT concentrations were varied from 1-10% (w/v). The volumes of the upper and lower phases were measured after the systems reached an equilibrium state. There is no phase separation until approximately 1.6% salt concentration is reached. Further increase in salt concentration increases the concentration of Aerosol OT in the coacervate phase. At greater than 2.6% salt concentration there is no further increase of Aerosol OT in the coacervate phase. The volume of the coacervate phase increases with the increase in Aerosol OT concentration. Aqueous dispersions of Aerosol OT in concentrations of 5% or higher exhibited characteristic aging properties. After aging at room temperature for 2 weeks or more, mild shaking converts the liquid into a gel structure. The gel structure reverts to the liquid state within 15-20 min after cessation of shearing.

24373 APTIC NO. 44136

Adair, R. R., E. H. Boult, and H. Marsh

GASIFICATION OF A BLAST-FURNACE COKE. A STUDY USING SCANNING ELECTRON MICROSCOPY. *Fuel, 51(1):57-63, Jan. 1972. 7 refs.*

An investigation was undertaken to ascertain whether coke pieces decrease in size on gasification with little other change, or whether pitting of coke surfaces occurs to greater or lesser extents during gasification. Should the latter occur, two adverse effects may result: pitting and development of fissures will decrease the resistance to surface abrasion causing fragmentation; development of fissures on a larger scale would lower progressively the load-bearing capacity of the coke pieces. Increased abrasion and fragmentation would decrease the permeability of the burden in the stack. Rates of gasification by carbon dioxide and oxygen were measured in a vacuum electromagnetic balance at 620, 820, 920, and 1200 C. Surface properties of these gasified carbons and cokes were monitored using scanning electron microscopy. Gasification proceeded not by a process of smooth surface ablation, but instead, surface pitting and fissure formation occurred. Increasing temperature apparently encouraged fissuring. The surface pitting may occur at positions of catalytically active impurities. (Author abstract modified)

24374 APTIC NO. 44017

Brannigan, P. G. and J. B. McQuitty

CONCENTRATION-TEMPERATURE RELATIONSHIPS OF ATMOSPHERIC GASEOUS CONTAMINANTS. *Can. Agr. Eng., 14(1):37-41, June 1972. 5 refs.*

The influence of ventilation on the distribution and dispersal of atmospheric gaseous contaminants under confined conditions was studied in an environmental chamber with facilities for simulating sensible heat and gas production of pigs. The chamber represented a full-scale section of a pig barn. The gases used were ammonia and carbon dioxide. The independent variables were ventilation rate, heat condition (isothermal and non isothermal), outlet height, height from floor, and distance from inlet. The procedures involved measurement of gas concentrations and temperatures in a longitudinal vertical plane within the chamber. The distribution and dispersal of sensible heat followed patterns similar to those of both gases. Significant correlation coefficients between temperature and gas concentration were obtained. An increase in temperature from inlet to outlet was noted. Outlet height has little practical importance. (Author summary modified)

24375 APTIC NO. 44461

Coonahan, Vincent Daniel

SORPTION AND PERMEATION OF HYDROCARBON VAPORS IN POLYMERS-A STUDY OF THE N-BUTANE-PROPANE-POLYETHYLENE SYSTEM. *Mary-*

land Univ., College Park, Dept. of Chemical Engineering, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., 1972, 138p. 67 refs.

An experimental determination of the mass transport properties of a ternary n-butane-propane-polyethylene system has been investigated using low density, semi-crystalline, nonporous polyethylene film. Permeation constants, diffusion coefficients, and solubility constants were calculated for various n-butane- propane mixtures at a total pressure of 765 mm and temperatures of 30, 40, 50, and 60 C. Pure component permeation constants and diffusion coefficients were also determined at partial pressures corresponding to component mixture compositions for n-butane at the aforementioned temperatures and for propane at 30, 40, and 60 C. It was found that the solubility isotherms of propane and n-butane obeyed Henry's law at most temperatures investigated. The permeation constants and diffusion coefficients of both n-butane and propane increased with increasing n-butane film concentration. The permeation constants and diffusion coefficients for both penetrants increased with increasing temperature. Permeation constants and diffusion coefficients for both penetrants were correlated as a function of n-butane concentration alone. Correlation which accounted for both temperature and n-butane film concentration dependence of the transport properties of both penetrants were developed, enabling the direct calculation of transport property with only a knowledge of the system experimental temperature and the n-butane vapor phase composition. The experimental mixture separation factors, defined as the ratio of the permeation constant of propane for any given temperature and mixture composition, varied from .321 to 1.904. The pure component separation factors calculated from the partial pressure experiments were consistently larger than the mixture separation factors. (Author abstract modified)

24376 APTIC NO. 44214

Czarnowski, J. and H. J. Schumacher

TRIFLUOROMETHYLHYPOFLUORIDE AND NITROGEN DIOXIDE REACTION KINETICS. *(Die Kinetik der thermischen Reaktion zwischen Trifluormethylhypofluorid und Stickstoffdioxid). Text in German. Z. Physik. Chem. Neue Folge (Frankfurt), vol. 78(5-6):234-242, 1972. 4 refs.*

The kinetics of the thermal reaction of trifluoromethylhypofluoride with nitrogen dioxide was studied in aluminum and magnesium cylinders at different surface-to-volume ratios in a temperature range of 94-120 C. The reaction products were analyzed by means of infrared spectroscopy. The reaction products obtained in aged cylinders were carbon oxyfluoride and nitryl fluoride. The reaction was of the second order, and occurred without pressure changes. No influence of reaction products, oxygen, and inert gases on the reaction was observed. The activation energy for the total reaction was 15,780 + or - 250 cal. The reaction rate in an aluminum reactor was 30-50% higher than in a magnesium reactor, due to a slow wall reaction in the former. The reaction in the magnesium reactor was a homogeneous gas reaction at a rate independent of the surface-to-volume ratio.

24377 APTIC NO. 44157

Egiazarov, Yu. G., L. A. Agabekova, M. F. Gorbatsevich, A. M. Smolskii, and N. S. Kozlov

GROUP COMPOSITION OF SULFUR COMPOUNDS IN GASOLINE AND KEROSINE-GAS OIL FRACTIONS OF BELORUSSIAN PETROLEUMS. *(Gruppovoy sostav sernistykh soyedineniy v benzinovykh i kerosinogazoylevykh fraktsiyakh belorusskikh neftey). Text in Russian. Khim. Tekhnol. Topl. Masel, 17(3):11-13, 1972. 13 refs.*

The fractions contained no hydrogen sulfide and free sulfur. Most of the sulfur in the light fractions was sulfide, including insignificant amounts of disulfide. The amounts of sulfide and disulfide decreased when passing from light to heavy fractions. The residual sulfur content increased to 60-80% by weight, based on the total sulfur with an increase in density of the fraction. The petroleums of intersalt deposits contained more sulfur (0.535 and 0.580%) than those of subsalt ones (0.405 and 0.485%).

24378 APTIC NO. 43909

Engels, G.

HOW VALUABLE IS CASTING REFUSE? (Wie wertvoll ist Giessereischutt?) Text in German. VDI (Ver. Deut. Ingr.) Nachr. (Berlin), 26(24):14-15, June 1972.

In 1971 the total quantity of refuse from foundries amounted to 4.3 million tons in the Federal Republic of Germany, consisting of slag, dust, furnace linings, and waste sands. To reduce the costs for refuse removal, many foundries recycle and reuse the waste sand. There are three methods to recover the waste sand: mechanical and thermal recovering and wet cleaning. Sands containing clay, phosphates, and resin residue are treated with water or soda lye to remove the residue. Silicates and carbonates are removed by means of mechanical treatment in crushers, rubbing tubes, and pneumatic crushers. Dedusting and removal of residue from the sand is effected in rotary screen separators, cyclones, or wet separators. Sands which are thermally recovered are very often superior to new sands. Thermal regeneration of sands is performed in rotary shaft furnaces with cooling drums, multi storied furnaces with stirring devices and cascade furnaces. Sands containing binding residue on hydrocarbon basis are especially adapted for recovering by means of thermal treatment. However, it must be provided for that the oxygen supply is sufficient, since hydrocarbons do not oxidize during combustion with a lack of oxygen. The flue gases developing during the thermal regeneration of casting sands contain carbon monoxide, carbon dioxide, ammonia, hydrocyanic acid, and nitrogen oxides. These gases can be removed by means of injecting hot soda lye, by thermal or catalytic post-combustion, by washing with phosphoric acid, or ozonization. Sand which is recovered by thermal recycling can be totally reused. The costs for the regeneration of mould sands fluctuate between $1.40/ton and $7.00/ton.

24379 APTIC NO. 43871

Eriksen, Trygve E.

SULFUR ISOTOPE EFFECTS. III. ENRICHMENT OF 34S BY CHEMICAL EXCHANGE BETWEEN SO2G AND AQUEOUS SOLUTIONS OF SO2. *Acta Chem. Scand., 26(3):975-979, 1972. 9 refs.*

The isotope fractionation factors for the sulfur isotopes 34S-32S between sulfur dioxide and aqueous solutions of SO2 with different fractions of the species SO2(aq), HSO3(-)(aq), and S2O5(2-)(aq) were measured at 25, 35, and 45 C. The isotope fractionation factors are plotted versus the ionic fraction. The experiments were carried out by bubbling SO2 with a constant 34S-32S isotope ratio for approximately two days through 50 ml ammonium hydrogen sulfite or perchloric acid solutions saturated with SO2. Gradient studies established that this was sufficient to achieve isotopic equilibrium. The total sulfur concentration in the solutions was in the range from 1.5 to 10 M. Gas samples were obtained from the gas phase of the equilibrated system and liquid samples by removing about 1 ml of the solution, acidifying with sulfuric acid, and flushing out all sulfur gas formed in a vacuum system. The samples were analyzed by mass spectrometry. A good agreement with results obtained by Rayleigh distillation was obtained when the ionic fraction equalled zero, which is equal to the isotope exchange coefficient for the system SO2(g)-SO2(aq).

24380 APTIC NO. 44006

Fesenko, A. V., G. P. Korneichuk, and V. G. Vysochenko

USE OF A PULSED MICROCATALYTIC METHOD FOR STUDYING THE MECHANISM OF THE CATALYTIC OXIDATION OF CARBON MONOXIDE ON CUPRIC

OXIDE. (O primenenii impul snogo mikrokataliticheskogo metoda dlya izucheniya mekhanizma kataliticheskogo okisleniya okisi ugleroda na okisi medi). Text in Russian. Kinetika i Kataliz, 13(1):237-240, 1972. 9 refs.

By using a micro-catalytic method, the time required for the reduction and oxidation of catalysts was reduced to 10 seconds. The reduction of the period between these processes caused the catalyst surface to be oxidized by the oxygen dissolved during its granulation. The comparison of the rates of the title catalyst reduction and of the catalytic oxidation of carbon monoxide reveals that the oxidation of CO involves the removal of oxygen from the catalyst surface.

24381 APTIC NO. 44164

Finelli, Vincent N., Edward F. Menden, and Harol G. Petering

ISOLATION OF METAL-BINDING FRACTIONS FROM TOBACCO SMOKE CONDENSATE. *Environ. Sci. Technol., 6(8):740-742, Aug. 1972. 13 refs.*

Tobacco smoke condensate (TSC) from nonfilter research cigarettes was fractionated on a weak cation exchange column (carboxymethyl cellulose in the Cu(II) form), yielding three fractions: noncomplexing substances, protonated copper-binding ligands, and nonprotonated copper binding ligands. Analysis for copper was done by atomic absorption spectrometry and showed the amount of complexed copper in the protonated ligand fraction to be 271 + or 42 micrograms/cigarette and in the nonprotonated ligand fraction to be 720 + or 59 micrograms/cigarette. Several known protonated and nonprotonated ligands were also fractionated on the cation exchanger, and their behavior was compared to that of the TSC fractions. The cation exchanger was also used in the zinc, cadmium, iron(III), and lead forms to determine the binding activity of whole TSC solutions toward these metals. Results, expressed in micromoles of metal/cigarette, were copper, 14.6; zinc, 12.8; cadmium, 8.3; iron, 0.5, and lead, 0.5. (Author abstract modified)

24382 APTIC NO. 44154

Gureev, A. A., L. G. Reznik, E. A. Reut, and Yu. F. Zheleznyak

EFFECT OF GASOLINE TEMPERATURE ON FUEL MIXTURE COMPOSITION IN CARBURETED ENGINES. *(Vliyanive temperatury benzina na sostav goryuchey smesi v karbyuratornom dvigatele). Text in Russian. Khim. Tekhnol. Topl. Masel, 17(3):41-44, 1972.*

The temperature dependence of the viscosity and density variation of gasoline was determined in the range -40 to +40 C. The mixture composition was influenced greatly by the temperature. The flow rate through the main jet of the K-89 carburetor was decreased about 20% and 15% by weight on using summer and winter gasolines, respectively, when the temperature decreased from +40 to -40. The fuel mixture also became leaner at low temperatures because of the temperature decrease of air and increase in the amount of air entering the engine.

24383 APTIC NO. 44369

Hems, R. V. and J. B. Adams

APPARATUS FOR THE INJECTION OF GAS SAMPLES UNDER VACUUM IN GAS CHROMATOGRAPHY. *Lab. Pract. (London), 21(6):430,432, June 1972. 2 refs.*

The vacuum inlet system is a simple, cheap, and accurate means of injecting gaseous samples in gas chromatography which are not of sufficient pressure to purge sample loops by more conventional means. The sample inlet consists of two on-off valves, a needle valve, a toggle switch operating a Schrader valve, a 0-760 mm pressure gauge, and a short length of copper tubing acting as the sample inlet port. The design and operation of the apparatus are described. Five commercial gas sample valves were tested for their suitability of use under vacuum. Every valve proved satisfactory over the range of partial pressures investigated (380-620 mm Hg). The viability of the inlet system for the analysis of kiln gases was also investigated. Fourteen consecutive injections into a Pye 104 gas chromatograph gave a mean peak height for sulfur dioxide of 179 mm, with a standard deviation of 0.78.

24384 APTIC NO. 44015

Hull, Leslie A., I. C. Hisatsune, and Julian Heicklen

LOW TEMPERATURE INFRARED STUDIES OF SIMPLE ALKENE-OZONE REACTIONS. *J. Am. Chem. Soc., 94(14):4856-4864, July 12, 1972. 43 refs.*

The reactions of ozone with ethylene, propene, isobutylene, cis-and trans-2-butene, cyclopentane, trimethylethylene, tetramethylethylene, and toluene were studied on the condensed phase at-175 to -80 F by infrared spectroscopy. At -175 F, two species are formed, tentatively identified as a pi complex and a primary ozonide (presumably 1,2,3-trioxolane). The only exceptions were ethylene, which did not produce the pi complex, and toluene which did not produce the ozonide. On warming the pi complex appears to revert to reactants, but the primary ozonide decomposes to products stable at room temperature. These include the secondary ozonides, ketones, aldehydes, acids, and polymeric material. The results are discussed in terms of both the Criegee and Story mechanisms. However, the finding of a single primary ozonide must temper the considerable speculation as to the number of intermediate species involved in the ozonation of olefins. (Author abstract modified)

24385 APTIC NO. 44317

Igarashi, Shigeru

DETERMINATION OF METHANOL CONCENTRATION IN ATMOSPHERE BY THE P-ROSANILINE METHOD. *(Para-rozanirin-ho ni yoru taikichu no metanoru teiryo). Text in Japanese. Bunseki Kagaku. (Japan Analyst) (Tokyo), 21(8):985-988, Aug. 1972. 5 refs.*

The major method of conversion of methanol to a colorimetrically determinable derivative is its oxidation to formaldehyde with potassium permanganate and phosphoric acid. However, since the reaction with these methanol oxidizing agents to form formaldehyde is incomplete, the calibration curve of methanol by the conventional chromotropic acid method is not linear for 5-100 micrograms/ml. An addition of potassium permanganate, sulfuric acid, and propionaldehyde promotes more oxidation of methanol to formaldehyde. The addition of propionaldehyde improves the determination of methanol by the conventional chromotropic acid method. The recommended analytical procedure for methanol by the p-rosaniline method is as follows. Ten milliliters of the test solution containing 3-60 micrograms of methanol are oxidized by adding propionaldehyde, potassium permanganate, and 0.5 N sulfuric acid. The solution is swirled and kept at room temperature for 10 minutes. Excess methanol oxidizing agents are reduced by adding sodium sulfite solution. The solution is swirled, and 1 ml of p-rosaniline hydrochloride solution (0.16 g dissolved completely in 24 ml of concentrated hydrochloric acid, and diluted to 100 ml) is added. The solution is again swirled, and allowed to stand for one hour at room temperature. The absorbance is measured at 580 nm against the reagent blank obtained by the same procedure. The calibration curve is linear for 3-60 micrograms/10 ml of methanol. The precision of the method is 0.025, the molar extinction coefficient is 5.4 times 10 to the 3rd power. The sensitivity of this method is the highest of those ever reported colorimetrically. Formaldehyde and ethylenglycol interfere seriously in this method. (Author abstract modified)

24386 APTIC NO. 43825

Jensen, D. E.

COMPETITIVE REACTION KINETICS IN SEEDED FLAMES AND ROCKET EXHAUSTS. *Combustion Flame, 18(2):217-225, 1972. 21 refs.*

In such nonequilibrium combustion systems as rocket exhaust plumes, reactions of the types X + HY yields XY + H, and X + Y + M yields XY + M, where X is a metal atom or free electron, Y is a free radical, and M is a collision partner, compete to determine concentration ratios of XY to X. Competitive criteria suggested by Sugden are modified, extended, and exemplified by reference to particular reactions of practical interest. The criteria help the chemist to select the minimum number of chemical reactions for computer calculations of the properties of combustion systems. Recommended rate coefficients and uncertainties are provided for several reactions of this sort. (Author abstract modified)

24387 APTIC NO. 44320

Kaemper, H.

DROPLET EVAPORATION INTRODUCES THE COMBUSTION PROCESS. *(Tropfenverdampfung als Einleitung des Verbrennungsvorganges). Text in German. Oel Gasfeuerung, 17(7):570-578, July 1972.*

Prior to combustion each fuel must be converted into the vaporous or gaseous phase. The time this conversion requires depends primarily on the size of the reaction surface; thus for fuel oil it depends on the average droplet size after atomization. If the oil droplets contain finely distributed water droplets, evaporation starts at 100 C and takes place quickly. Finely distributed water has the effect of promoting atomization. This secondary atomization in connection with a high flame temperature contributes to the limitation of the soot development. Combustion of the fuel depends on diffusion of oxygen through the vapor surrounding the droplets. The time required for complete combustion is influenced by the particle size as well as by the oxygen gradient between fuel and combustion air. The finest particles burn first. At near stoichiometric combustion, the time increases considerably. It is important that the atomization takes place in rotary symmetry, otherwise strands of local air surplus and air deficiency develop. As a consequence the droplets are only partly gasified. This holds primarily for the larger droplets. They expand under the influence of the temperature, and hollow, spherical, porous solid bodies of carbon are formed. When these bodies reach the temperature zones below 800 C they extinguish and are emitted as solid particles.

24388 APTIC NO. 44562

Kawaguchi, Ichiro, Nobuyuki Oda, and Shun Mizuno

OBSERVATION OF A SMOKE RING ON OCTOBER 30, 1970. *Solar Phys., 22(1):140-141, Jan. 1972. 1 ref.*

At Okayama Astrophysical Observatory, a smoke ring was observed on the limb of the sun. The observation was made using the solar coude telescope equipped with a Halle birefringent filter. During the observation, the passband was set at 1 A centered on the H-alpha line, while the diameter of the solar image was 18 cm. A series of photographs was made consecutively by a Nikon motor derive camera with an exposure time of 10 sec at a rate of one for every 40 sec. The faint prominence from which the smoke ring was formed was located at the position angle of 128 degrees on the solar limb. The prominence brightened three times during the 12 min period of observation. Following the maximum brightness a gas ejection occurred, and the prominence was transformed into a smoke ring. The outer and inner diameters of the smoke ring were estimated at 22,000 km and 6000 km. The lifetime of the smoke ring was less than three minutes. In the formation period of the smoke ring the mean velocity was 170 km/sec, with a strong deceleration of the ejected gas occurring with the appearance of the ring.

24389 APTIC NO. 44155

Kazanskaya, N. S. and E. V. Smidovich

EFFECT OF ALKALI ADDITIVES ON THE COMPOSITION OF MAZUT AND CRACKING RESIDUE COKING PRODUCTS. *(Vliyaniye shchelochnykh dobavok na sostav produktov koksovania mazuta i kreking-ostatka). Text in Russian. Khim. Tekhnol. Topl. Masel, 17(3):22-26, 1972. 11 refs.*

Potassium hydroxide had a dehydrogenation effect, with the formation of gases containing less than or equal to 1% hydrogen, based on the raw material. Mazut and cracking residue, containing 4-5% KOH, yielded coke containing less than or equal to 2 and 1.8% instead of 4.4 and 3.6% sulfur without KOH addition, respectively. The addition of more than 10-11% KOH produced a high specific surface coke of the activated carbon type. Coke from mazut had a considerably greater specific surface than that from cracking residue. The variation of the sulfur content of the coke depended on the activity and size of its specific surface and raw material origin, which indicated the possibility of a sulfur carbon complex formation.

24390 APTIC NO. 43846

Kloster, Jean Pierre and Hans-Guenther Lintz

THE EFFECT OF GAS TEMPERATURE ON THE RATE OF A HETEROGENEOUS REACTION. A PARASITE EFFECT OCCURRING DURING THE NITROUS OXIDE DECOMPOSITION OVER PLATINUM IN A CLOSED REACTOR. *(Einfluss der Gastemperatur auf die Geschwindigkeit einer heterogenen Reaktion. Ein parasitaerer Effekt bei der Untersuchung der N2O-Zersetzung auf Platin in einem geschlossenen Reaktor). Text in German. Z. Physik. Chem. Neue Folge (Frankfurt), 78(3/4):215-218, May 1972. 4 refs.*

The effect of the gas temperature on the catalytic decomposition rate of nitrous oxide was investigated in closed reactor under ultra high vacuum. The decomposition rate of N2O in the absence of oxygen (initial phase of the reaction) was independent of the gas temperature, while the latter influenced the oxygen inhibition of the decomposition rate at temperatures above 900 C. This effect was caused by the dissociation of oxygen over platinum as oxygen was pumped off the reactor wall depending on the wall temperature. The collision yield for N2O decomposition was higher at -183 C than at +25 C, as the oxygen partial pressure at -183 C in a stationary state was about one fourth that at a 25 C wall temperature. The dependence of the decomposition rate in the presence of oxygen on the wall temperature may thus be due to the pumping effect along with the non-activated oxygen adsorption.

24391 APTIC NO. 44232

Krieger, Barbara, Mazen Malki, and Ralph Kummler

CHEMILUMINESCENT REACTIONS OF OXYGEN ATOMS WITH REACTIVE HYDROCARBONS. I. 7000-9000 A. *Environ. Sci. Technol., 6(8):742-744, Aug. 1972. 11 refs.*

The reaction of oxygen atoms with unsaturated hydrocarbons at pressures of approximately 1 torr produces intense emission in the spectral region form 7000-9000 A. Absolute intensity spectra were obtained using nitric oxide plus oxygen as an actinometric standard. The signal-to-noise ratio for the spectra obtained appear to be much larger than the chemiluminescence recently reported at similar pressures for ozone plus ethylene. The combination of the wavelength region and the banded, rather than continuum, structure of the atom-originated emission offers a potential for chemiluminescent monitoring of reactive hydrocarbons under conditions analogous to their direct role in photochemical smog formation. (Author abstract modified)

24392 APTIC NO. 43857

Lawrence, W. R. and A. B. Huang

AEROSOL DEPOSITION FROM TURBULENT GAS FLOW. I. WITHOUT COAGULATION. *Preprint, American Inst. of Aeronautics and Astronautics, New York, 13p., 1972. 23 refs. (Presented at the American Institute of Aeronautics and Astronautics, Aerospace Sciences Meet-*

ing. 10th. San Diego, Calif., Jan. 17-19, 1972, Paper 72-81.)

A theoretical study of the polydisperse aerosol deposition from fully developed turbulent flow was made, based on the mixing-length hypothesis. Analytical expressions were found for the noncoagulating polydisperse aerosol deposition. Results are also presented of some associated detailed numerical solutions for the noncoagulating polydisperse aerosol concentration distribution and surface deposition characteristics. Comparisons made between available experimental data, the analytical results presented here, and the associated numerical solutions indicate that the results obtained represent a considerable improvement in available analytical prediction capability with regard to aerosol deposition from turbulent gas flows in the regime of fully developed turbulent flow for which particle re-entrainment can be neglected. Aerosol deposition is a fundamental mechanism utilized in several air cleaning equipment applications and is a major concern of air pollution control efforts. (Author abstract modified)

24393 APTIC NO. 44141

Margolis, Geoffrey and John N. Driscoll

CRITICAL EVALUATION OF RATE-CONTROLLING PROCESSES IN MANUAL DETERMINATION OF NITROGEN OXIDES IN FLUE GASES. *Environ. Sci. Technol., 6(8):727-731, Aug. 1972. 19 refs.*

The phenol disulfonic acid procedure for nitrogen oxides analysis requires considerable standing time (about 24 hr) for completion. A theoretical evaluation of the procedure has indicated that the rate-controlling step is the gas phase oxidation of nitric oxide which produces a species that is more easily absorbed. This conclusion was verified experimentally. Strategies for reducing the analysis time are discussed. These strategies were based on increasing oxidation rates by mixing with pure oxygen and operation at elevated pressures. Use of rapid chemical analysis methods were also considered. Analysis showed that for operation at atmospheric pressure, mixing with oxygen resulted in a maximum reduction in oxidation time of about fivefold. Oxidation time at other pressures was inversely proportional to the square of the total pressure. For a sample containing 400 ppm NO, use of these procedures can reduce overall analysis time to 5 hr for atmospheric operation, and to about 10 min for operation at 10 atm. (Author abstract modified)

24394 APTIC NO. 43743

Matteson, M. J., J. F. Fox, and O. Preiming

DENSITY DISTRIBUTION OF SODIUM CHLORIDE AEROSOLS FORMED BY CONDENSATION. *Nature Phys. Sci., 238(82):61-63, July 24, 1972. 6 refs.*

For the calibration of sizing instruments and for laboratory experiments, the use of well defined aerosols is highly desirable. Not only should all particles be of the same phase and chemical composition, but also the same size and shape. For this purpose a whole class of condensation aerosol generators, known as LaMer-type generators, are widely used. It is anticipated that the particles formed by the generator have the same density as the bulk material; and it is generally assumed that once the aerosol exhibits higher order Tyndall spectra, the particle size distribution resembles a rather monodispersed aerosol. A modified LaMer-type generator for sodium chloride aerosols was built to investigate the problem of whether the density of the aerosol is or is not the same as the bulk material.

24395 APTIC NO. 4292

Muehle, J.

INVESTIGATION OF PARTICLE PATHS IN CURVILINEAR FLOW. PART II: NUMERICAL RESULTS FOR A FEW TECHNICALLY IMPORTANT TYPES OF FLOW. *Untersuchung von Partikelbahnen in gekruemmten Stroemungen Teil II: Numerische Ergebnisse fuer technisch bedeutsame Stroemungsformen. Text in German. Chem.-Ing.-Tech., 44(14):889-899, July 1972. 16 refs.*

Equations of motion for spherical particles in nonlinear flows are solved with regard to a few important industrial processes. In the case of the flow of media loaded with solids around bends, the equations yielded information in connection with impingement abrasion and the angle and site of impingement of the particles. A consideration of the separatory effect of flow deflections led to information about the degree of fractional separation. In the case of plane flow vortex centers, the calculations were in good agreement with those quoted by other authors. Particle paths in separators with logarithmic and Archimedean spiral flow were also considered. The influence exerted by various forms of air circulation on the motion of droplets in spray dryers is illustrated with the aid of an example for three-dimensional particle paths. (Author abstract modified)

24396 APTIC NO. 44078

Pevnev, N. G.

EVALUATING THE EFFECT OF LIQUEFIED GAS CHEMICAL COMPOSITION ON THE DETONATION STABILITY OF THE MIXTURE. *(Metod otsenki vliyaniya khimicheskogo sostava szhizhennykh gazov na detonatsionnuyu stoykst smesi). Text in Russian. Khim. Tekhnol. Topl. Masel, 17(3):45-47, 1972. 4 refs.*

The octane number of liquefied petroleum gases, containing insignificant amounts of carbon-2 and carbon-5 hydrocarbons, for internal combustion engines was determined within approximately 1 unit by nomograms based on the composition. Mixtures containing propene obtained from gas-fractionation plants gave a large spread of the octane numbers determined. Suitable results were obtained when the mixtures contained less than 5% C3H6. The nomograms are recommended for selecting mixtures of effective composition for detonation and for quality control of liquefied petroleum gases.

24397 APTIC NO. 44158

Popl, M., M. Kuras, and M. Mostecky

HYDROGENATED PYROLYSIS OIL AS RAMJET FUEL COMPONENT. *(Gidrirovannoye piroliznoye masla kak komponent reaktivnykh topliv). Text in Russian. Khim. Tekhnol. Topl. Masel, 17(3):48-50, 1972. 11 refs.*

A fraction at 200-330 C, containing 96.9% aromatic hydrocarbons, obtained from gasoline pyrolysis for ethylene production was hydrogenated at 200 C and 125 atm on a Raney nickel catalyst. The hydrogenate containing 97.6% saturated hydrocarbons and no sulfur components was qualitatively close to ramjet fuels T-1 and Jet A-1. Its crystallization temperature was less than -65 C. The hydrogen consumption for hydrogenation was 6.2% based on the original fraction.

24398 APTIC NO. 43698

Ramthun, H. and K. Debertin

BURN-UP DETERMINATION OF IRRADIATED FUELS BY MEANS OF THEIR HEAT OUTPUT. BASIC RELATIONS AND MEASUREMENTS OF A HIGHLY ENRICHED URANIUM AT A VERY LOW BURN-UP LEVEL. *Atomkernenergie, 19(1): 17-22, Feb. 1972. 13 refs.*

The relation between the heat output of an irradiated fuel specimen and the corresponding relative burn-up value is discussed. Computations of heat power values for different irradiation histories, but the same burn-up, demonstrate that the knowledge of the reactor operating periods usually on hand may be sufficient to infer the actual burn-up from a measured heat power. An adiabatic calorimeter with suitable dimensions and sensitivity for the available sections of MTR fuel elements has been constructed and a specimen of low burn-up has been measured. By aid of a computer program, taking into account more than 40 fission nuclides, a burn-up value has been evaluated which agrees with the result of gamma spectroscopic determination within the measurement uncertainty. (Author abstract modified)

24399 APTIC NO. 44032

Rao, V. Kuppu and C. R. Prasad

KNOCK SUPPRESSION IN PETROL ENGINES. *Combustion Flame, 18(2): 167-172, April 1972. 25 refs.*

Some experiments are described which establish beyond doubt that lead monoxide particles in the solid phase can suppress knock in gasoline engines by a heterogeneous reaction mechanism. The effectiveness of tetraethyl lead can be completely accounted for if some of the tetraethyl lead that decomposes forms lead monoxide particles before the reactions leading to knock occur in the end gas. This is indicated by a comparison of the total surface area furnished by the lead monoxide particles thus formed, with the total surface area of lead monoxide powder directly supplied for achieving similar knock suppression. Many other lead compounds exerted antiknock effects in the solid phase to varying degrees. The antiknock effects of different compounds followed the same trend as their inhibitive effects on hydrocarbon oxidation reactions in low pressure reaction vessels. The total surface area of the inhibiting compound is the chief criterion that decides its effectiveness rather than the weight of lead it contains. (Author abstract modified)

24400 APTIC NO. 43751

Reigel, Stanley A. and Charles D. Doyle

USING THE PSYCHROMETRIC CHART. *Pollut. Eng., 4(2):51-53, March- April 1972.*

A psychrometric chart is a handy tool for simplifying industrial air pollution control calculations. Psychrometrics means the evaluation of air properties and the processes which alter these properties. Definitions are given for absolute humidity, relative humidity, dry air, dew point temperature, dry bulb temperature, wet bulb temperature, adiabatic saturation temperature, and humid volume. A psychrometric chart graphically displays the above mentioned terms over a range of temperatures and humidities. Five examples are given to explain the various uses of the psychrometric chart.

24401 APTIC NO. 44160

Schofield, Keith

THE RATE OF DESTRUCTION OF 02 (1-DELTA-G) BY ATOMIC HYDROGEN. *Intern. J. Chem. Kinet., 4(3):255-263, May 1972. 72 refs.*

An analysis of the atmospheric observations of 02(1-Delta-g) in the dayglow and twilight confirms conclusions of earlier researchers that the reaction H + 02(1-Delta-g) yields OH + O is relatively slow, much slower than was expected or can be easily explained in theoretical terms. Using a value for the concentration of atomic hydrogen at 85 km, an upper limit rate of 3 times 10 to the minus 13th cu cm/molecule/sec would be compatible with current atmospheric models. An evaluation of the available data for the rates of several reactions involving ground state or electronically excited species, for which the values are reasonably well established, is included to better analyze the general effects of an electronically excited reactant. This research further illustrates the unusual slowness of the H + 02(1-Delta-g) reaction.

24402 APTIC NO. 44332

Seeley, J. L., D. Dick, J. H. Arvik, R. L. Zimdahl, and R. K. Skogerboe

DETERMINATION OF LEAD IN SOIL. *Appl. Spectry., 26(4):456-460, July/Aug. 1972. 12 refs.*

The analytical determination of lead in soil is discussed with particular reference to emission spectrographic and atomic absorption spectrophotometric methods. The problems associated with the two techniques are discussed, and accuracy and precision data are presented. Data indicating that the titanium-to-lead concentration ratio can be used to differentiate between lead contaminated and noncontaminated soils are presented. To check the possible use of titanium as a contamination reference, the emission spectrometric photo plates accumulated in the analysis of soil samples were used to determine the intensity ratio I-lead(2633)/ I-titanium(2942), and this was correlated with the lead concentration determined for each sample. Samples from three different locations were collected. The correlation coefficient calculated for the data obtained is 0.97. If the titanium concentration is constant over the sampling domain at a particular location, the lead-to-titanium intensity ratio should be a constant for those samples which are not contaminated with lead from non natural sources, i.e., an analysis correlating the intensity ratio with the lead concentration of noncontaminated samples should show no correlation. There is no correlation, and the titanium ratio can be used to determine which samples represent the natural lead concentration in the soil. Since it was proved that the titanium ratio method produces the same result as the previous statistical analysis, it is appropriate to consider the potential universality of this approach. Application of the indicator element approach to other types of systems will require that other criteria dependent on the system in question be satisfied to validate the technique.

24403 APTIC NO. 43719

Smith, D. H. and G. Eglinton

COMPOUND CLASSIFICATION BY COMPUTER TREATMENT OF LOW RESOLUTION MASS SPECTRA: APPLICATION TO GEOCHEMICAL AND ENVIRONMENTAL PROBLEMS. *Nature, 235(5337):325-328, Feb. 11, 1972. 31 refs.*

The large number of mass spectra that are generated by gas chromatographic-mass spectrometric (GC-MS) examination of lipid fractions are being processed more frequently by on-line digital computers. The development of a computer analysis of low resolution GC-MS data is described which provides a preliminary classification of an unknown spectrum as a listing of candidate classes of compounds. The analyst may then select those spectra which merit detailed interpretation and study. This capacity to sort, arrange, and effectively display in order of importance is of great value in dealing with complex mixtures of compounds. The method is essentially the file or library search approach. Classification of Mass Spectra on Computers (COMSOC) operates by converting an incoming unknown mass spectrum into a simplified key word which is then compared with each of the 65 key words held in its reference file. The computer then prints out the best matched reference key words as a listing of the chemical classes they represent. The compact key word used by COMSOC is the ion-series spectrum, or reduced mass spectrum, which is essentially constant for a particular hydrocarbon class. Classes at present represented in the correlation set include a variety of normal, branched, and cyclic alkanes, alkenes, benzenoid compounds, polynuclear aromatics, ethers, aldehydes, ketones, esters, and amines.

24404 APTIC NO. 44481

Stoeckli, H. F.

SURFACE CHEMISTRY OF POLYMERS: THE ADSORPTION OF CARBON DIOXIDE AND SULFUR DIOXIDE ON POLYVINYLIDENE CHLORIDE. *Helv. Chim. Acta., 55(13):101-106, 1972. 10 refs.*

Results of an investigation of the adsorption of nitrogen, carbon dioxide, and sulfur dioxide on polyvinylidene chloride are discussed. Isotherms for the adsorption of N (77 K), CO2 (195-247 K), and SO2 (254-293 K) on PVDC were measured volumetrically. The B.E.T. cross-sectional areas of CO2 and SO2 are comparable to liquid density values. The isosteric heat of adsorption of CO2 is constant for 0.2 less than Theta less than 0.4 micron, and is lower than the latent heat of condensation. For SO2, the two are practically identical up to the monolayer. Entropy calculations show supermobility in the case of CO2 i.e., entropy loss of adsorption is less than predicted for the loss of one translational degree of freedom, assuming that the adsorbed film behaves like a two-dimensional gas. (Author abstract)

24405 APTIC NO. 43775

Takahashi, K.

BEHAVIOR OF AEROSOL PARTICLES IN CLOSED VESSEL. *(Mippei yokinai no earosoru ryushi no kyodo). Text in Japanese. Kuki Seijo (Clean Air - J. Japan Air Cleaning Assoc., Tokyo), 10(2):27-33, June 1972. 21 refs.*

Behavior of aerosol particles in a closed vessel is discussed mathematically. The flow of aerosol particles in a vessel is usually vigorous, and the velocity, concentration, and temperature are almost homogeneous at every location except the boundary layer on the wall. The coagulation of particles is due to the Brownian motion, velocity slope, and turbulent flow, in which Brownian motion predominates. The precipitation of particles on walls is mainly due to gravity, diffusion, and thermal migration. The coagulation and precipitation constants are calculated and plotted for a vessel 3000 cm in diameter and 5000 cm in height at a certain flow condition.

24406 APTIC NO. 43873

Tilford, S. G. and J. D. Simmons

ATLAS OF THE OBSERVED ABSORPTION SPECTRUM OF CARBON MONOXIDE BETWEEN 1060 AND 1900 A. *J. Phys. Chem. Ref. Data, 1(1):147-187, 1972. 17 refs.*

The results of a recent investigation of the carbon monoxide absorption spectrum between 1060 and 1900 A are summarized. Twelve electronic transitions are observed in this region; four electric dipole allowed electric transitions from the ground state Chi(1)Sigma(+) to the A(1)Pi, B(1)Sigma(+), C(1)Sigma(+), and E(1)Pi states, and eight forbidden transitions to the a-prime(3)Sigma(+), e(3)Sigma(-), a(3)Pi, D(1)Delta, d(3)Delta(i), I(1)Sigma(-), j(3)Sigma(+), and c(3)Pi states. The following items are presented: a photograph of the spectrum with band assignments; a table of band head measurements and assignments arranged by wavelength; a summary of the spectroscopic constants and potential curve for each electronic state; and a line list, arranged by wavelength, of the observed rotational lines of the allowed transitions. (Author abstract modified)

24407 APTIC NO. 43728

Viossat, V. and J. Chamboux

ACETALDEHYDE OXIDATION AT LOW TEMPERATURES. CARBON MONOXIDE AND CARBON DIOXIDE FORMATION KINETICS. *(Oxydation de basse temperature de l'acetaldehyde. Etude cinetique de la formation du monoxyde et du dioxyde de carbone). Text in French. Bull. Soc. Chim. France, no. 5:1699-1702, May 1972. 16 refs.*

The relative stability of the radicals formed during the slow oxidation of acetaldehyde in a temperature range of 190-272 C was studied by gas-chromatographic determination of carbon monoxide and carbon dioxide accumulated during the reaction of a mixture of 42.5% acetaldehyde and 57.5% oxygen. The very unstable acetoxyl radical is not likely to occur at temperatures above 190 C. The decomposition of the peracetic radical, at the expense of peracetic acid formation, seems considerable above a temperature of about 270 C. The radical decomposition reactions produce methyl radicals which can again oxidize or form methane. The CO and CO2 accumulation is parallel, and the ratio of the partial pressure of O2 and CO2 increases as a function of time, temperature, and acetaldehyde concentration to reach a value above one at maximum acetaldehyde concentration. Both CO and CO2 are formed, the former from decomposition reactions only, and the latter from peracetic or acetoxyl radicals, even at the start of the reaction. While CO2 is essentially formed from peracetic acid up to 260 C, it is formed from the acetoxyl radical above this temperature.

24408 APTIC NO. 43904

Voigt, Horst

POWER ECONOMICAL OPTIMATION OF TUBULAR FURNACES. *(Energiewirtschaftliche Optimierung von Roehrenofenanlagen). Text in German. Chem. Tech. (Berlin), 24(5):290-293, May 1972.*

The flue gases leave the tubular furnace with temperatures of 350 to 450 C and flow into the atmosphere. About 25% of the heat content of flue gases is discharged into the environment. This waste heat could be economically re-used in the mineral oil industry for preheating the combustion air for the tubular furnaces in separate air preheaters, for superheating the low pressure saturated steam in the economizer, and for production of slightly superheated steam in waste heat boilers. The latter use is the most common and most economical one. A waste heat boiler comprises the boiler itself with the heating surfaces for the economizer, the evaporator and the superheater, a blower for passing the flue gases to the stack, a supply pump as well as the hot water circulation pump, the pipes for water and steam, and accessories such as samplers and cooler for salt water. The investment costs for the entire waste heat utilization plant are composed of the sum of the costs for the individual units listed, the installation costs, and the costs for the adjustment which is required for integration of the waste heat boiler plant into a petrochemical plant. The specific investment and operating costs drop with increasing steam production by the boiler. The higher the entrance temperature of the flue gases is, the lower are the costs for a boiler with a certain steam production capacity. Just ahead of the waste heat boiler, however, the flue gas temperature should not exceed 500 C. The economic operation of a waste heat utilization system with a capacity of 60 Gcal/hr was studied. The graphical illustration shows that within two years the costs for the plant amortized.

24409 APTIC NO. 43702

Wada, Hajime

THE DEPENDABILITY OF STANDARD GAS. *(Hyojun gasu no shinraisei ni tsuite). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 39(6):557-564, June 1972.*

Standard gases for use in air pollution analysis are discussed in terms of accuracy and stability. At high concentrations, a standard deviation of less than 1% is easy to obtain for the calculation of concentration. An example of the calculation of a high concentration of primary standard gas using 1 to 5% n-propane or 1,3-butadiene in helium as the sample shows that the standard deviation is about 0.1%. Calculation of 2000 ppm sulfur dioxide in nitrogen shows that the standard deviation is as high as 0.7%. When the residue pressure, caused by impurities in the container, exists due to the chemical reaction, the standard gas concentration becomes unstable.

24410 APTIC NO. 43864

Warpinski, N. R., H. M. Nagib, and Z. Lavan

EXPERIMENTAL INVESTIGATION OF RECIRCULATING CELLS IN LAMINAR COAXIAL JETS. *Preprint, American Inst. of Aeronautics and Astronautics, New York, 9p., 1972. 14 refs. (Presented at the American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 10th, San Diego, Calif., Jan. 17-19, 1972, Paper 72-150.)*

Utilizing several unique means of introducing smoke into a flow field for careful visualization in addition to hot-wire techniques, experiments were performed in a specially designed facility producing laminar flows up to considerably high Reynolds numbers. Characteristics of the cells and the flow conditions that bring them about were documented by smoke photographs in the Reynolds number velocity ratio plane and the results were compared to previous analytical predictions. The cells were found to fall into three categories with different flow characteristics involving unsteadiness in position, and shear layer instabilities which result in higher mixing with the outer streams. The mixing of confined coaxial jets has many applications, such as the concept of a coaxial gaseous fuel nuclear rocket engine. This concept requires a minimum of mixing between the heavy, slow-moving fuel jet and the light, fast-moving outer propellant jet. (Author abstract modified)

24411 APTIC NO. 44371

Wettack, F. Sheldon

A PHOTOMETRIC STUDY OF THE N2O4-NO2 EQUILIBRIUM. *J. Chem. Educ., 49(8):556-558, Aug. 1972. 5 refs. (Presented at the American Chemical Society, National Meeting, 161st, Los Angeles, Calif., April 1970.)*

A commonly employed experiment in the physical chemistry laboratory is the study of the nitrogen tetroxide-nitrogen dioxide equilibrium. If this gas phase system is studied as a function of temperature, various equilibrium thermodynamic quantities can be readily assessed. This experiment is included in several physical chemistry laboratory textbooks, using the experimental approach of Verhoek and Daniels. The experimental techniques in this approach, however, are not sufficiently advanced for the modern physical chemistry laboratory. An alternate way of studying this equilibrium, involving a photometric study of the equilibrium based on the work of Harris and Churney, is described. By using a colored gas and a sufficiently simple photometer, the student is able to observe the progress of the equilibrium reaction. The non-monochromatic source, the focusing system, the interference filter, the cell, and the detection device are all visible to the experimenter.

24412 APTIC NO. 44150

Winkler, Gustav

NITRIC OXIDE EMISSION AND PEAK PRESSURE IN THE OTTO ENGINE. *(Stickoxid-Emission und Spitzendruck im Ottomotor). Text in German. Staub, Reinhaltung Luft, 32(6):239-242, June 1972. 31 refs.*

Nitric oxide emissions from internal combustion engines are difficult to predict numerically because of uncertainties in the determination of the temperature and composition of the gas in the cylinder. Also, questions arise when using data of reaction kinetics obtained with simpler systems. Peak pressure in the cylinder is therefore postulated as a simple and easily measured parameter. Peak pressure is the variable that unifies NO emission data when spark advance and compression ratio are varied. Using available data on NO reaction kinetics, it is also shown that emissions can be predicted numerically in fair quantitative and good qualitative agreement with measurements as a function of peak pressure for lean engine operation. (Author summary modified)

24413 APTIC NO. 43969

Yokochi, Akira and Akira Kanagawa

PROBLEMS IN GENERATION OF MONODISPERSE LATEX AEROSOL. *(Shikenyo ratekkusu hyojun enmutai hasseiho no mondaiten). Text in Japanese. Kagaku Kogaku (Chem. Eng.), 36(6):676-679, June 1972. 14 refs.*

Latex standard particles have been used recently in the area of calibration of particle measuring methods and in efficiency tests of smog collection devices. The schematic diagram of the latex aerosol generator with compressor, dryer, filter, atomizer, mixing and drying chamber, and flowmeter is presented. The total distribution of latex aerosol diameters was determined by a method in which the output pulse of the dispersing ray particle counter was sent to the radiation measurement multiple wave high analyzer. The latex solution was diluted by de-ionized distilled water and adjusted for the concentration. The centrifugal separation method and membrane filter were used for the separation of a fusion stabilizer from the latex particles. Particle counters were used for the measurement of diameter distribution. The radiation measurement 1024 channel wave high analyzer was used for the analysis of the results. The results of aggregate particles in 1.90 micron latex aerosols, weight concentrations of latex and stabilizer, and size distribution of 1.90 micron latex aerosols are shown in tables. A comparison of the size distribution spectra for dried air flow rates of 15 l/min and 7.5 l/min are presented. The effect of the dried air flow rate on the size distribution of 0.500 micron latex aerosols with 0.01, 0.05 wt% concentration is presented. The effect of the hydrosol concentration on the size distribution of 0.500 micron latex aerosols is presented.

24414 APTIC NO. 43954

Zelazny, S. W., J. H. Morgenthaler, and D. L. Herendeen

SHEAR STRESS AND TURBULENT INTENSITY MODELS FOR COFLOWING AXISYMMETRIC STREAMS. *Preprint, American Inst. of Aeronautics and Astronautics, New York, 12p., 1972. 29 refs. (Presented at the American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 10th, San Diego, Calif., Jan. 17-19, 1972, Paper 72-47.)*

Accurate predictions of the mean velocity field for data covering a wide range of conditions were made using an eddy viscosity model. This model was developed through correlation of the turbulent shear and intensity. In addition, the model has accurately predicted the mean velocity and mass fraction distributions downstream of an injector element with initial conditions considerably outside the range from which the models were developed. Both low speed and supersonic quiescent and coflowing jets have been successfully correlated; primary jet molecular weights range from 2.0 to 120.09. The data used was tested for consistency by comparing momentum and injected gas integral balances at each axial station. Comparisons between predicted and experimental mean velocities, mass fraction, shear stress, and turbulent intensities are presented. The ability to describe complex turbulent mixing phenomena is essential if the performance of systems such as rocket injectors, combustion lasers, scramjet combustors, and gaseous core nuclear rockets are to be modeled. In addition, a mixing model which could predict details of the turbulence, i.e., turbulent shear and intensity, could be used to predict aerodynamic jet noise. (Author abstract modified)

EFFECTS-HUMAN HEALTH

24415 APTIC NO. 44313

REPORT OF SPECIAL COMMITTEE ON ENVIRONMENTAL STANDARDS FOR POLLUTION BY SUSPENDED PARTICULATES. *(Fuyu ryushijo busshitsu ni yoru kankyo osen no kankyo kijun ni kansuru senmon iinkai hokoku). Text in Japanese. Taiki Osen Nyusu (Air Pollution News), no. 70:40-44, May 1972.*

The diameter of the suspended particulates discussed is less than 10 micron. Research and studies of the relationship between suspended particulates and human health were surveyed. Suspended particulates directly affect respiratory organs. The light scattering method, weight concentration by filtration method, and the air sampler are used for the measurement of suspended particulates in Japan. Visibility is less than 2 km with a concentration of 600 micrograms/cu m and less than 8 km with a concentration of 150 micrograms/cu m. Respiratory diseases occur more frequently in the location in which the concentration is 100 micrograms/cu m. With a concentration of 150 micrograms/cu m the morbidity and mortality rates increase. The proposed standard for pollution by suspended particulates is that the one hour average concentration through 24 hours should be under 100 micrograms/cu m, and one hour average concentration should be under 200 micrograms/cu m.

24416 APTIC NO. 44368

Banyai, Andrew L.

EXPOSURE TO OXIDES OF NITROGEN. *Chest, 61(4):345, April 1972. 5 refs.*

Literature concerning the effects of nitrogen dioxide on the respiratory organs of man and experimental animals is reviewed. Nitrogen oxides in concentrations of 60 ppm inhibit the ciliary function of the bronchial mucosa in man. In rabbits, guinea pigs, and rats, various respiratory disorders have been induced with concentrations of NO2 between 5 and 25 ppm. Repeated short exposure to low concentrations of NO2 in silos is likely to cause chronic silo-filler's disease with progressive granulomatous changes.

24417 APTIC NO. 43726

Bates, D. V., G. M. Bell, C. D. Burnham, M. Hazucha, J. Mantha, L. D. Pengelly, and F. Silverman

SHORT-TERM EFFECTS OF OZONE ON THE LUNG. *J. Appl. Physiol., 32(2): 176-181, Feb. 1972. 20 refs.*

Ten normal male subjects were exposed to 0.75 ppm ozone while seated for 2 hr in a large environmental chamber. Three of these subjects were also studied in the chamber during bicycle exercise sufficient to double minute ventilation. Subjects were asked to report the development of any symptoms. From measurements of mouth and esophageal pressure as well as airflow the following parameters of pulmonary function were obtained: vital capacity, maximum static elastic recoil pressure of the lung, forced expiratory volumes, static pulmonary compliance, dynamic compliance, pulmonary resistance, flow rates at 50% of the actual vital capacity, and maximal expiratory flow-volume curves and percent carbon monoxide uptake were also measured. Most subjects noted substernal soreness and cough, while a few also complained of symptoms of pharyngitis and dyspnea. Mean data from the 10 subjects showed a significant fall in elastic recoil pressure of the lung, increase in pulmonary resistance, and fall in flow rates at 50% of the actual vital capacity. However there was considerable variation in individual response to each test. In two of three subjects who exercised intermittently during ozone exposure, both symptoms and changes in parameters of pulmonary function were markedly accentuated. It was concluded that 0.75 ppm of ozone, in the absence of other pollutants, is too high a level for 2-hr exposure of a general population. (Author abstract modified)

24418 APTIC NO. 44489

Berendt, Richard F., Emerson L. Dorsey, and Henry J. Hearn

VIRUCIDAL PROPERTIES OF LIGHT AND SO2. I. EFFECT ON AEROSOLIZED VENEZUELAN EQUINE ENCEPHALOMYELITIS VIRUS. *Proc. Soc. Exp. Biol. Med., 139(1):1-5, Jan. 1972. 14 refs.*

A combination of 3.6 ppm of sulfur dioxide gas and 308 mcal/sq cm/min of simulated solar radiation were highly toxic in tests using airborne Venezuelan equine encephalitis. The virus decayed more rapidly at 60% relative humidity (RH) than at 30% RH, with decay rates of 40% vs 25%/min, respectively. Although pollutant and light are toxic separately, their effect together is greater than the sum of the separate effects, suggesting that an interaction occurs. Lowering the light intensity to 40 mcal/sq cm min produced a similar though decreased effect at 60% RH. At 30% RH, however, the SO2-light combined effect was not found; in this case SO2 alone effected viral inactivation to a significantly greater degree than either light alone or the SO2-light combination. The data suggest that, in this case, the low intensity of light acted upon the SO2 directly, preventing it from attacking the virus. (Author summary modified)

24419 APTIC NO. 44040

Bergman, I.

A NEW METHOD FOR EVALUATING THE RANK OF COAL FROM THERMOGRAVIMETRIC CURVES: THE IDENTIFICATION OF COAL AND SOOT ISOLATED FROM PNEUMOCINIOTIC LUNGS. *Fuel, 51(3):99-103, April 1972. 3 refs.*

Thermogravimetric studies were carried out on residues prepared from the lungs of pneumoconiotic coal miners. These residues, isolated by digestion of formalin-fixed tissue in acetic acid, were compared thermogravimetrically with similarly treated powders of respirable size prepared from coals of various rank, and from various forms of soot. A new method of evaluating the rank of coal from the thermograms was developed. In general, there was a significant correlation between the results of residues isolated from pneumoconiotic lungs and the industrial histories. In some cases, however, the residues were of unexpectedly high rank, and electron microscopy confirmed that these residues contained a large proportion of soot. The source of the soot is believed to be the naked lights formerly used in some pits. (Author abstract modified)

24420 APTIC NO. 44041

Bergman, I.

THERMOGRAVIMETRIC STUDIES ON CARBONACEOUS MATERIALS ISOLATED FROM LUNG TISSUE BY DIGESTION IN PHOSPHORIC ACID: THE CATALYSIS OF COMBUSTION BY INORGANIC MATERIALS. *Fuel, 51(2):116-119, April 1972. 5 refs.*

Low- and high-rank coal and soot had been isolated previously in good yield from post-mortem pneumoconiotic lungs by acetic acid digestion, and thermogravimetry of the residues had enabled the coal rank to be evaluated and the sooty lungs to be distinguished from the rest. The differences in combustion temperature of these materials were less than those of undigested materials because of what appeared to be catalytic effects; the high-rank coal and soot adsorbed catalytic materials during digestion, whereas the low-rank coal lost materials that were presumably catalytic. Attempts have been made to remove the catalytic materials adsorbed on the soot by use of alkali or mineral acids, but these served only to introduce further catalysts of combustion. The catalytic effects of a number of carbonates, oxides, halides, and other salts on the thermogravimetric curves of coal and soot samples were studied and related to previous work. In general, phosphates showed no catalytic effects. A procedure was therefore developed for the digestion of lung tissue and clay minerals in phosphoric acid at 105 C. The rank of coal in residues from pneumoconiotic lungs could not be so well evaluated as after acetic acid digestion, but coal, soot, and graphite could be more easily distinguished from one another. (Author abstract modified)

24421 APTIC NO. 44370

Bridges, B. A.

SCREENING FOR ENVIRONMENTAL AGENTS CAUSING GENETIC DAMAGE: INTRODUCTION. *Lab. Pract. (London), 21(6):411-412, June 1972. 9 refs.*

In a recent analysis of admissions to a large American childrens hospital, it was estimated that over 30% of the patients were suffering from diseases which could be attributed wholly or partly to genetic causes. Some geneticists are concerned that a steady accumulation of mutations arising from man-made agents may occur in the human population and that these will escape detection until a substantial deterioration in the genetic stock has already occurred. In the United Kingdom there are no mandatory mutagenicity tests for food additives, pharmaceuticals, or pesticides, and yet examples can be found in all three categories of substances which have been proved to be mutagenic in laboratory systems. For the detection of heritable gene mutations, simple cellular systems are the most suitable laboratory tests because the problem of chromosome duplication preventing expression does not arise or is easily circumvented. Screening systems in bacteria, yeasts, and cultured mammalian cells are relatively cheap and extremely rapid.

24422 APTIC NO. 44381

Brooks, Robert E.

ULTRASTRUCTURAL HISTOPATHOLOGY OF LUNGS OF LABORATORY RATS EXPOSED TO ENVIRONMENTAL AGENTS. *In: Annual Progress Report, June 1, 1971 to May 31, 1972. Oregon State Univ., Corvallis, Environmental Health Sciences Center, Center for Environmental Management Proj. 15, p. 83-84, 1972.*

Lung tissues from rats exposed for up to 372 days to dietary dieldrin, dietary methyl mercuric chloride, dietary lead acetate, atmospheric carbon monoxide, atmospheric nitrogen dioxide, and dieldrin in combination with other agents are being processed for both routine histopathological study and detailed electron microscopic examination. Specimens are carefully examined for blood vessel damage, airway injury, edema, inflammation, and cell proliferation. At the electron microscopic level, tissues are examined for intracellular alteration and disturbances of cell-to-cell relationships. Preliminary gross and light microscopic examination of dieldrin-treated (5 ppm) rats indicated that most lung tissues are relatively normal. Some dieldrin-treated rats showed an increased incidence of lobular pneumonia as well as small focal pneumonic involvement--an emphysema-like condition--and an arteritis involving medium sized arteries. No morphological alterations was detected in rat lungs due to administration of dietary lead (3 ppm) or dietary methyl mercuric chloride (2 ppm). Similarly, no effect on lung tissue from inhaled carbon monoxide (100 ppm) was detected. Inhalation of NO2 (3 ppm) in air for up to 233 days resulted in relatively little peripheral lung damage, although mucus production in distal bronchioles was increased.

24423 APTIC NO. 44251

Buckup, Heinrich

LEAD FROM THE VIEW OF OCCUPATIONAL MEDICINE. *(Dad Blei aus arbeitsmedizinischer Sicht). Text in German. Z. Erzbergbau Metallhuettenwesen, 25(7):323-326, July 1972. 12 refs.*

The atmospheric air we breath contains considerable lead concentrations which come mainly from the exhaust gases of automobiles operated with leaded gasolines. Extensive measurements of the atmospheric lead concentration were taken all over the industrialized world. Extremely high concentrations were measured in Japan (60 micrograms/cu m) and in the United States (120 micrograms/cu m). Recent measurements in Frankfurt yielded concentrations between 2.3 and 7.0 micrograms/cu m. The lead which is breathed by humans with the ambient air is usually in form of very fine-grained dust (weighing less than 1 microgram). Generally it is assumed that about 50% of the particles are retained and 100% of the retained lead is absorbed. In the Federal Republic of Germany the maximum allowable emission concentration is 2 micrograms/cu m air. The absorbed lead circulates in the blood and tends to deposit in the bones. Chromosome damage by lead compounds has been reported. Lead diseases by occupational exposure are on a downward trend. In the year 1965, 237 cases were reported of which actually 118 had the disease. Of them only 10% were incapacitated for more than 3 months.

24424 APTIC NO. 44380

Burt, George S.

PSYCHOBIOLOGICAL ASPECTS OF ENVIRONMENTAL HEALTH. *In: Annual Progress Report, June 1, 1971 to May 31, 1972. Oregon State Univ., Corvallis, Environmental Health Sciences Center, Center for Environmental Management Proj. 16, p. 85-86, 1972.*

Previous studies with fixed interval and differential reinforcement of low rates schedules indicated that administration of single dieldrin doses as low as 2.5 mg/kg affects behavior of Japanese quail and rats, and that the effects can still be detected 48 hours later. Since these effects were detected with a rather small number of subjects and with electro-mechanical programming and recording equipment, it seemed likely that threshold measurements of the effects of dieldrin on these operant schedules could be obtained with computer-controlled systems which are substantially lower than would have been suggested by the earlier findings. Much larger numbers of subjects are now being trained on these schedules, as well as on a descrimination reversal problem with the aid of the computer-controlled set of operant conditioning chambers. Preliminary results with an eight-station system controlled by a PDP-8/I computer led to the design and construction of a more sophisticated system for use with a PDP-12 computer. This system, which can handle up to 32 stations, includes a remote data link for use with the controlled environment chambers used for chronic exposure to gaseous contaminants. A series of studies is planned in which animals with electrode plants in selected brain regions would be studied for the effects of low levels of dieldrin on the frequency, amplitude, and wave form of spontaneous brain electrical activity.

24425 APTIC NO. 44387

Claeys, Robert R.

ANALYTICAL SUPPORT AND METHOD DEVELOPMENT. *In: Annual Progress Report, June 1, 1971 to May 31, 1972. Oregon State Univ., Corvallis, Environmental Health Sciences Center, Environmental Toxicology of Pesticides Proj. C-12, p. 200-211, 1972. 21 refs.*

Analytical procedures involved in an experimental program to study the effects of dieldrin are described. The analytical chemistry group provided chemical analyses for several projects, assisted in the development and maintenance of carbon monoxide and nitrogen dioxide atmospheres in the co-stressor program, developed suitable methods for determining p-nitrophenol in the urine of rats exposed to parathion, and took steps to decrease the time required for pesticide analyses. Special procedures were also initiated to determine if the metabolites of dieldrin could be measured using a microcoulometric detector. Three metabolites were found in both male and female rat tissue. The identity of metabolite A is not known. Metabolite B is probably the hydroxylated dieldrin product, and metabolite C is probably the ketone methylene bridge-metabolite. To expedite pesticide analyses, a 4 ft by 6 ft by 2 ft deep drying oven capable of reaching 300 C was constructed to eliminate the need for extensive glassware washing and to reduce the pesticide contamination to below detectable levels; and the hexane-aqueous acetone partition after extraction with a 2:1 hexane-acetone mixture was eliminated.

24426 APTIC NO. 44012

Dinman, Bertram D.

NON-CONCEPT OF NO-THRESHOLD: CHEMICALS IN THE ENVIRONMENT. *Science, 175(4021):495-497, Feb. 4, 1972. 11 refs.*

Present confusion that equates the presence of a biological effect with a deleterious implication ignores several concepts. To believe that a single molecule's presence in a cell implies a definite potential for deleterious effect disregards stochastic considerations. To believe that such molecules cause an undesirable effect disregards the presence of multiplicity of interfering substances. Such thinking also does not take into account the fact that the dose of a foreign atom may be related to the probability of its interacting with an available active site, or that similar probability governs the answers to the question of whether interactions will occur at discrete topographical loci upon a structural or functional molecule or on a possible precursor. While the construction of a stochastically sound model is remote, the reasonableness of the hierachy of cellular element concentrations as these relate to metabolic function suggests that a threshold for biological activity exists within a cell at 10,000 atoms. Since the cellular organism operates within a quantitative rate limit that transcends any statements having only qualitative bases, concepts concerning encroachments on response capabilities over a lifespan are inadequate descriptors of biological activity in the absence of quantitative qualifiers. (Author summary modified)

24427 APTIC NO. 44388

Fang, S. C.

BIOCHEMISTRY OF MERCURY INTOXICATION. *In: Annual Progress Report. June 1, 1971 to May 31, 1972. Oregon State Univ., Corvallis, Environmental Health Services Center, Adjunct Grant Proj. 6, p. 220-225, 1972.*

A preliminary study was made of in vivo effects of phenylmercuric acetate in rats using carbon(14)-labeled glucose, leucine, phenylalanine, serine, glutamate, succinate, acetate, and formate, as a tracer. A major portion of the C(14) was incorporated into the respiratory carbon dioxide, the amount depending on the labeling position and the compound utilized. Oral treatment of rats with phenylmercuric acetate (PMA) had an inhibitory effect on the in vivo conversion of formate carbon to CO2. Furthermore, the incorporation of formate into urinary urea was decreased with the formation of a new labeled metabolite. Such measurements seem promising for early detection of the development of toxic effects and in predicting mercurialism. Another area of investigation involved an in vitro study of the effect of mercury on the metabolism of C(14)-lacate by rat kidney slices. A lesser degree of poisoning was observed in the in vitro experiments.

24428 APTIC NO. 44385

Fink, G. B.

PHARMACOLOGICAL EFFECTS OF PESTICIDES. *In: Annual Progress Report. June 1, 1971 to May 31, 1972. Oregon State Univ., Corvallis, Environmental Health Sciences Center, Environmental Toxicology of Pesticides Proj. B-8(1), p. 168-172, 1972.*

The toxicity of organochlorine insecticides, lead, and carbon tetrachloride, the interactions among these agents, and neuropharmacologic parameters of seizures induced by the agents were studied in experimental animals. Median lethal doses for lead and for the organochlorine insecticides were determined. Female mice were more susceptible to the toxic effects of lead over a longer period of time than males. The organochlorine insecticides increased the susceptibility of mice to clonic seizures produced by electrical stimulation and by intravenous infusion of pentylenetetrazol. Although lead intoxication is reported to precipitate convulsions, little effect of lead on experimental seizure thresholds was noted. Lead also had little effect on rotating rod performance, whereas dieldrin exhibited definite impairment that was dose related. The effect of endrin on rat heart muscle was studied in vitro. Endrin did not alter the development of contractile force in the isolated trabecular muscle of the rat heart. Exposure of rats to low levels of DDT greatly potentiates the hepatotoxicity of CCl4 as demonstrated by increased serum transaminase levels, altered liver function tests, and histopathologic changes.

24429 APTIC NO. 44011

Folz, Jean-Martin

MERCURY AND CADMIUM POLLUTION: TWO MAJOR PROBLEMS IN JAPAN. *(La pollution par le mercure et le cadmium: deux problemes majeurs au Japon). Text in French. Ann. Mines (Paris), no. 15:43-44, March 1972.*

The catastrophic situation regarding air and water pollution in Japan is briefly described. The respective death tolls due to Minamata (organic mercury poisoning) and Itai-Itai (cadmium poisoning) are 52 and more than 100 by now. The mercury level in the Japanese is 10 times that the European, while cadmium can be found in rice, oyster, and tobacco. Respiratory troubles have high incidence in many industrial areas, and 1% of all patients treated have respiratory troubles due to air pollution. The frequency of chronic bronchitis in the age brackets over 40 and 70 years in Osaka is above 3% and 12%, respectively. The urine lead level in many city-dwellers is higher than that due to occupational exposure. Acid smog over Tokyo was observed in 1970. The formation of high air and water pollution levels is facilitated by specific features of Japan such as high population density, irregular rains, floods, and frequency of industrial and farming zones.

24430 APTIC NO. 44384

Gillett, James W.

PESTICIDE-STRESSOR INTERACTIONS WITH MICROSOMAL ENZYME SYSTEMS AND ASSOCIATED ACTIVITIES. *In: Annual Progress Report. June 1, 1971 to May 31, 1972. Oregon State Univ., Corvallis, Environmental Health Sciences Center, Environmental Toxicology of Pesticides Proj. A-1, p. 111-118, 1972.*

The effects of dieldrin and/or co-stressors on microsomal aldrin expoxidase activity of rat liver were investigated. Littermate groups of male rats were exposed at weaning to various regimens of dieldrin (0, 0.625, and 5.0 ppm) and/or two levels of co-stressor. The animals were sacrificed at 42, 70, 112, 171, 261, and 400 days of age. No substantive interaction of any of the community A co-stressors (parathion, methyl mercury, and carbon monoxide) with dieldrin was evident for any epoxidase activity especially at the highest level of dieldrin and co-stressor. There was a statistically significant decline in epoxidase activity with increasing CO dosage at 42 days of age, not evident at later ages. Significant induction was noted at 171 days with dieldrin alone or in combination with 2.0 ppm methyl mercury or 100 ppm CO and at 261 days with the combined dieldrin parathion treatment. In general, the co-stressors did not affect significant changes in dieldrin residues, which were highly variable and generally constant through the age groups. Experiments on community B (with nitrogen dioxide, lead acetate, and a Salmonella infection as stressors) are not yet complete, but thus far induction is significant at all ages examined. It appears to be impaired by NO2 exposure, as is the basal activity.

24431 APTIC NO. 44386

Harr, James R.

EFFECT OF MULTIPLE TOXIC ENVIRONMENTAL AGENTS AT THE CELLULAR TO INDIVIDUAL LEVELS OF BIOLOGICAL ORGANIZATION. *In: Annual Progress Report. June 1, 1971 to May 31, 1972. Oregon State Univ., Corvallis, Environmental Health Sciences Center, Environmental Toxicology of Pesticides Proj. B-9, p. 175-180, 1972.*

Large numbers of genetically uniform Wistar rats were exposed to several regimens of single and multiple environmental toxicants. The regimens were designed to simulate current environmental exposures of people; provide supplemental observations on the pharmacodynamics of dieldrin; confirm and extend knowledge of an apparent compensation-decompensation mechanism observed with exposure to 5 ppm dietary dieldrin; and determine if miniature and standard swine were suitable subjects for evaluation of effects of environmental toxicology. In the first series of rat experiments, the co-toxicants used with dieldrin were carbon monoxide in air at 10 or 100 ppm, methyl mercury added to the feed at concentrations of 0.2 or

2.0 ppm Hg, and cutaneous exposure to concentrations of 60 or 600 ppm parathion in ethanol. In the second series of experiments, the co-toxicants were atmospheric nitrogen dioxide at 0.3 ppm, lead acetate added to the feed at 0.3 and 3.0 ppm elemental lead, and weekly addition of a culture of Salmonella san diego (3 or 300 logarithmic growth phase bacteria) to the drinking water of each rat. Preliminary analysis of dieldrin residue accumulation in the cerebrums of male rats indicated an age-related compensating-decompensating mechanism. There is an initial increase in dieldrin residue followed by a plateauing or decreasing residue concentrations from 40-100 days after exposure. This compensating mechanism then breaks down, and the concentration of dieldrin residues again increases at a steady rate. The mechanism was not altered by exposure to CO, methyl mercury, or parathion at the levels used. Possible interactions between the chlorinated hydrocarbon and the co-toxicants were observed. These included alterations in dieldrin metabolites, in parathion excretion in liver microsomal activity, and in dieldrin residue levels with parathion and CO. Over 90-95% of the dietary dieldrin was absorbed by the rats. After exposure to dieldrin, hepatic cells in tissue of miniature swine were 35 to 65% vesicular.

24432 APTIC NO. 43729

Hueper, W. C.

ENVIRONMENTAL CANCER HAZARDS. *J. Occupational Med. (Ottawa), 14(2):149-153, Feb. 1972.*

At present every fourth or fifth adult American acquires a cancer during his or her lifetime, and many of these die from this disease. Its incidence is attributable to a significant degree to a greatly improved control of infectious diseases by therapeutic and sanitary measures resulting in a marked reduction in the environmental foci of infections, and to a growing recent contamination of the human environment with man-made carcinogens. Because of the long latent period of these cancers, the full impact of the rapid and marked contamination of the human environment with carcinogens is still to come. Cancers of the bladder have been found in about 100% of dead aromatic amine workers in American industries where beta-naphthylamine was manufactured. It is not unlikely that such acute and catastrophic epidemics of cancer may occur in the general population, unless comprehensive and effective control measures for arresting and reducing the further introduction of man-made carcinogens into the human environment are taken. Different chemical carcinogens exhibit a distinct organ specificity in their action, and experiments have shown that the carcinogenic target or organs can be preselected and directed by the proper choice of a particular nitrosamine. It is biologically significant that cancers induced in exposed tissues showing such pericancerous and pre-cancerous lesions more often arise de novo than from malignant transformations of primarily benign tumors often preceding or accompanying the appearance of cancerous growths. Patients who are given drugs known to have induced cancers in animals should be kept under prolonged observation for delayed cancerous responses. Under no circumstances should a maximally permissible dose be established for a chemical possessing carcinogenic properties, because no reliable method exists for determining any submarginal or safe dose for man for any known carcinogenic agent. Since occupational cancers represent the prototypes of all environmental cancers, because they usually furnish the most readily available and most favorable medium for ascertaining human evidence on the action of environmental carcinogens, a greatly increased epidemiologic study of cancer hazards in industry and occupations should be undertaken.

24433 APTIC NO. 44176

Kaltstein, Andrej

ENVIRONMENTAL PROTECTION AS A SOCIO-POLITICAL DEMAND OF THE 70'S. *(Umweltschutz als gesellschaftspolitische Forderung der 70er Jahre). Text in German. Oeffentl Gesundheits wesen (Stuttgart), 34(6):343-348, June 1972.*

Of the total air pollution, 80% is attributed to traffic. The following harmful substances are emitted by automobiles: Hydrocarbons, nitrogen oxides, carbon monoxide, and lead. The nitrogen oxides are extremely toxic. They irritate the mucuous membranes which manifests itself by irritation of the eyes, sore throat, and cough. In higher concentrations they may cause pneumonia. The maximum allowable emission concentration is 0.5 ppm. In Munich this value is exceeded at many points. The average CO concentration in the air above Munich is 30 ppm. Eight hour exposure to this concentration leads to reduced capacity and affects the heart contractions. The hydrocarbons contain carcinogenic substances such as benz-3,4-pyrene. A close relationship between the lung cancer rate and the increasing traffic density exists. In the center of Essen, where traffic is particularly dense, the lung cancer rate is 10 times higher than in rural areas. In German cities a lead concentration of 5 to 10 mg/cu m air is measured. In Moscow, where leaded gasolines are outlawed, the lead concentration in the air is only 0.7 mg/cu m. Lead is particularly well retained by the lung. It tends to be stored in the body. The causes for the ever increasing air pollution must be seen in the ever expanding economy and in the individual freedom of our society.

24434 APTIC NO. 43964

Kitagawa, Tetsuzo

AIR POLLUTION BY SULFURIC ACID AND ITS EFFECT. *(Ryusan misuto ni yoru taiki osen to sono eikyo). Text in Japanese. Anzen Kogaku (J. Japan Soc. Safety Eng.), 11(1):1-11, Feb. 1972. 22 refs.*

The injuriousness of sulfur dioxide and sulfuric acid mist was discussed and an up to date literature survey was presented. Sulfuric acid mist is much more injurious to health than SO2. The respiratory organs show symptoms with 1.6 ppm SO2 and with 0.35 mg/cu m H2SO4 mist. The 1.6 ppm SO2 can be converted to 6.4 mg/cu m sulfuric acid mist. The effect of H2SO4 mist depends on the diameter of a particle. If the diameter is less than 1 micron, it penetrates to lung cells and causes constricture. The fatal dose of H2SO4 mist for guinea pigs depends upon their age. The younger the test animal, the lower the dose. It is coincidental that human children have more constricture than adults. There are two main effects of the H2SO4 mist. First, it causes constricture as does SO2. The minimum amount of H2SO4 mist to cause this symptom is 1/20 of the amount of SO2. Secondly, it causes corrosion in the membrane of the respiratory organ. The organic system is broken and complete constricture will occur. The production of H2SO4 mist by SO2 oxidation has been studied by many people and a literature survey is presented. The SO2 is oxidized in the air and becomes sulfuric acid. The particles in the air become the core of the H2SO4 mist. The metal ions of iron and manganese in the particle work as catalysts. The production of H2SO4 mist by a splash of H2SO4 and evaporation of concentrated H2SO4 were discussed.

24435 APTIC NO. 44079

Kuzmenko, N. M.

HYGIENIC STANDARDIZATION OF THE CONTENT OF RESORCINOL MONOMETHYL ETHER IN THE AIR OF INDUSTRIAL PREMISES. *(Gigiyenicheskoye normirovaniye soderzhaniya m-monometilovogo ve fira rezortsina v vozdukhe proizvodstvennykh pomeshcniy). Text in Russian. Gigiena i Sanit., 37(3):108-109, 1972. 3 refs.*

The recommended maximum allowable concentration of resorcinol monomethyl ether in the atmosphere is 0.5 mg/cu m. A concentration of 2.12 mg/cu m did not produce any observed effects in guinea pigs, but did produce a reduction in nervous sensitivity in rats after 3 months. The rats recovered in 2 weeks after termination of the experiment. The LD(50) in mice and rats are 312 and 597 mg/kg, respectively.

24436 APTIC NO. 44175

Lave, Lester B. and Eugene P. Seskin

AIR POLLUTION, CLIMATE, AND HOME HEATING: THEIR EFFECTS ON U. S. MORTALITY. *Am. J. Public Health, 62(7):909-916, July 1972. 12 refs.*

To test whether previously estimated relationships between U. S. mortality rates and air pollution were spurious, variables were added for home heating characteristics and the climatology of a region. The objective was to determine whether these new variables would cause the estimated effect of air pollution to fall and become statistically insignificant. In general, the air pollution variables were quite stable. The effect of air pollution on U. S. mortality has also been corroborated by different functional forms, by data from another year, and by investigation of age, sex, and race specified death rates. In general, the significance of the pollution variables is enhanced by disaggregating the mortality rates. When home heating fuels were added to the regression, air pollution variables tended to lose significance. Thus, home heating appears to be a major source of air pollution. Lowering the measured levels of minimum sulfate readings and mean particulate readings by 10% is estimated to lead to a .897% decrease in the total death rate. A 50% abatement would lower the death rate by 4.485%. Of the 14 climatological variables tested, only two were statistically significant. Damp regions have a lower death rate than dryer regions. As the number of very hot days increases the death rate falls.

24437 APTIC NO. 43942

Morgan, A., A. Black, M. Walsh, and D. R. Belcher

THE ABSORPTION AND RETENTION OF INHALED FLUORINATED HYDROCARBON VAPOURS. *Intern. J. Appl. Radiation Isotopes, 23(6):285-291, June 1972. 8 refs.*

Radioactive tracer techniques were used to measure the partition coefficients of four aliphatic fluorinated hydrocarbons in olive oil and serum. These compounds were shown to have a low lipid solubility compared to the aliphatic chlorinated hydrocarbons. Chlorine-38-labelled fluorocarbons were administered to volunteers in a single breath, to simulate administration from pressurized bronchodilator aerosols in which they are used as propellants. Measurements were made of the change in concentration in alveolar air with breath-holding time, and the elimination in breath during normal breathing over a period of 30 min. Because of its low lipid solubility, much of the inhaled fluorocarbon vapor is exhaled without being absorbed. After 30 min the fraction of administered material retained varied from about 10% for fluorocarbon-114 to 23% for fluorocarbon-11. A few measurements were made of levels of fluorocarbons in venous blood. These showed that after 5 min only a small fraction of the retained material was present in the blood stream. The rate of transfer to other compartments was less rapid for fluorocarbon-11 than for fluorocarbons-12 and -114. There has been a marked increase in recent years in the number of sudden and unexpected deaths among asthmatics, a trend which may be linked to the increasing use of fluorocarbon-propelled bronchodilator aerosols in the treatment of this disease. (Author abstract modified)

24438 APTIC NO. 44352

Nagata, Minoru

EPIDEMIOLOGICAL STUDIES ON ESTIMATION OF HUMAN DAMAGES PRODUCED BY AIR POLLUTION. PULMONARY FUNCTIONS OF SCHOOL CHILDREN IN TWO AREAS OF GUNMA PREFECTURE WHERE SUFFICIENT DATA ON CHEMICAL DETERMINATION CONTAMINANTS ARE UNAVAILABLE. *(Taikiosen ni yoru jintai higai suitei no ekigakuteki kenkyu: dai 1-ho. Osen busshitsu no kagakuteki sokutei shiryo ga fujubun naru Gunma-kenka 2 chiku no gakudo kenshin seiseki). Text in Japanese. Kita Kanto Igaku (Kitakanto Med. J.), 22(1):49-64, 1972. 19 refs.*

Mass examinations of the pulmonary function of schoolchildren in two areas near chemical factories and near a refinery were performed in the winter of 1969 and 1970 in order to estimate the damage to the human body. The areas examined were Annaka and Shibukawa cities in Gunma Prefecture. The children, aged 6-12 years, numbered 2795. In schoolchildren living near a group of chemical factories, the forced vital capacity was significantly lower than in controls in both sexes and in all age groups excepting those aged 12. Significant differences in peak flow rate were observed only in 6-7 year old lower class children. In schoolchildren living near a refinery, each observed value was generally lower than in controls. But only vital capacity and force expiratory volume in 11 year olds showed significant differences. Prevalences of restrictive and obstructive impairment and of a combination of them were significantly higher in schoolchildren living near a group of chemical factories.

24439 APTIC NO. 44098

Nizze, H.

TRUE AND SO-CALLED ASBESTOS BODIES. *(Echte und sogenannte Asbestkoerper). Text in German. Deut. Med. Wochschr., 97(27):1045, July 1972. 10 refs.*

True asbestos bodies stem from the inhalation of asbestos fibers. So-called asbestos bodies are pseudo-asbestos bodies which are morphologically identical to the true asbestos bodies but stem from inhalation of other fibrous material. The true asbestos bodies are difficult to distinguish from the pseudo-asbestos bodies. The claim that all asbestos bodies found in routine autopsy material stem from the inhalation of asbestos cannot be entirely accepted. A good deal of the asbestos bodies found in the lungs of humans throughout the world could stem from other fibrous material.

24440 APTIC NO. 43764

Oldham, P. D., J. Donald Ball, W. Clarke, J. C. Gilson,
Audrey Hanson, F. E. Keal, E. N. Moyes, P. Richardson,
A. T. M. Roberts, and J. C. Wagner

A SURVEY OF PLEURAL THICKENING: ITS RELATION TO ASBESTOS EXPOSURE AND PREVIOUS PLEURAL DISEASE. *Environ. Res., 5(2):142-151, June 1972. 4 refs.*

Asbestosis, and other evidence of asbestos exposure, is known to be strongly associated with abnormalities of the pleura. Occupational histories were studied of men and women aged over 40 years who had attended chest clinics in Birmingham, England, and whose chest radiographs showed pleural thickening or calcification, and of an age and sex-matched control group. Of 3868 radiographs examined, 186 showed pleural abnormalities other than unilateral obliteration of the costophrenic angle. From these 186 persons and their matched controls, adequate occupational histories were obtained in 113 pairs. There was no convincing evidence that more of those with abnormalities of the pleura than those without had been exposed to asbestos, but a greater proportion of those with pleural abnormalities did have a history of previous pleural inflammations and injuries. Between 4-11% of each group, according to the criterion used, had a history of definite asbestos exposure. (Author abstract modified)

24441 APTIC NO. 44053

Piscator, Magnus and Birger Lind

CADMIUM, ZINC, COPPER, AND LEAD IN HUMAN RENAL CORTEX. *Arch. Environ. Health, 24(6):426-431, June, 1972. 12 refs.*

Analysis of cadmium and zinc in the renal cortex of 67 Swedish subjects disclosed the same dependence on age as in United States subjects. In the 6-50 year age group, cadmium content and the cadmium-zinc ratio were correlated to age; thereafter, there was a decrease in cadmium and zinc and in the cadmium-zinc ratios. The increase in zinc paralleled the increase in cadmium. The difference between total zinc and the amount of zinc equivalent to the amount of cadmium provides a measure of the physiological zinc content of the cortex, this fraction, 160 ppm (based on dry weight of renal cortex), did not vary with age. In the age groups over 60, cadmium content was significantly lower in women than in men. That the levels of copper did not vary with age indicated that, when there is no excessive exposure to cadmium, copper metabolism in the kidney will not be disturbed. Lead showed an increase with age. However, the amounts were small in comparison with the cadmium levels, and normal exposure to lead can hardly be a contributory factor in kidney disease. The necessity of supplying adequate amounts of zinc to people exposed to cadmium is considered, as it is through that some forms of hypertension in man may result from a relative zinc deficiency through accumulation of cadmium. (Author abstract modified)

24442 APTIC NO. 44225

Rhoades, Rodney A. and David G. Frazer

INFLUENCE OF INHALED CARBON PARTICULATES ON PULMONARY SURFACE AREA. *Proc. Soc. Exp. Biol. Med., 140(3):1045-1048, July 1972. 21 refs.*

Pulmonary surface area was significantly reduced in rats chronically exposed to low levels of carbon particulates (545 micrograms/cu m, + or 193 SD) for nine months. The decrease in surface area was much more pronounced at lower lung volumes. The suggestion is made that the reduction in lung surface area is related to terminal airway obstruction. Pulmonary surface area was computed from the change in surface free energy at the gas-liquid interface from total collapse to maximum volume. (Author summary modified)

24443 APTIC NO. 44261

Satake, Tatsuo, Michihiro Hara, Hiroshi Ishikawa, Kazuo Rynge, Yoshimasa Ishigawa, Kiyoshi Kasama, and Takeo Iida

RELATIONSHIP BETWEEN MORPHOLOGICAL CHANGES AND PULMONARY FUNCTION TESTS IN CHRONIC BRONCHITIS AND CHRONIC PULMONARY EMPHYSEMA. *(Mansei kikashien to Mansei haikishu ni okeru keitagaku teki jushodo to haikino shoryo no kankei). Text in Japanese. Nippon Naika Gakkai Zasshi (Tokyo), 61(1):32-41, Jan. 1972. 15 refs.*

The effects of the morphological changes of chronic bronchitis and chronic pulmonary emphysema on pulmonary function were studied. Thirty-seven patients of chronic bronchitis and 41 patients of chronic pulmonary emphysema were subjected to the examination. Besides the measurements of the ventilatory capacities (VC), total lung capacities (TLC), 1 second forced expiratory volume (FEVI), and carbon monoxide pulmonary diffusing capacities (DLCO), spirometry tests were made. For chronic bronchitis, the VC, TLC, FEVI, and the maximum ventilatory volume (MVV) were all within the normal range. There were no differences between the three degrees of symptoms. For chronic pulmonary emphysema, the ratio of residue volume to TLC increases and the FEVI and the MVV decreases as the symptoms change from mild to severe. Significant differences were found between the mild degree and severe degree.

24444 APTIC NO. 43725

Scanlon, John

FETAL EFFECTS OF LEAD EXPOSURE. *Pediatrics, 49(1):145-146, 1972.*

It has been demonstrated that concentrations of lead found in the average child (20 to 40 micrograms/100 g whole blood) can inhibit delta-aminolevulinic acid (ALA) dehydratase activity. In suckling rats these usual lead levels inhibit ALA dehydratase activity in the blood and brain. Furthermore, the brain enzyme activity correlated with blood ALA dehydratase activity, suggesting that blood ALA dehydratase may be a useful measure of central nervous system enzyme activity. A small number of umbilical cord bloods from normal new-born infants revealed a mean lead level of 22 micrograms/100 g. It would be reasonable to expect that ALA dehydratase activity might have been diminished in utero at these lead levels. If these postulated intra-uterine enzyme effects do occur, they must be documented; this kind of knowledge will further understanding of the environment and of basic fetal physiology.

24445 APTIC NO. 44364

Scanlon, John

HUMAN FETAL HAZARDS FROM ENVIRONMENTAL POLLUTION WITH CERTAIN NON-ESSENTIAL TRACE ELEMENTS. *Clin. Pediatr., 11(3):135-141, March 1972. 41 refs.*

Mercury, lead, cadmium, arsenic, titanium, nickel, vanadium, and niobium are some of the trace elements which might reach the fetus because of environmental pollution. It is postulated that the ability of living things to absorb trace metals from the environment is inversely related to the concentration of cadmium in the environment, and it appears that there are other rather complex interactions among the single elements. To evaluate the interuterine effects of any pollutant it is necessary to consider the genetic background of the fetus. Data on the alteration of fetal nutrition by the effects of the trace metals is extremely scarce, and in light of the adverse effects of these elements upon adults and other forms of life, and the ability of these materials to cross into the placenta, a need for information in this area is identified.

24446 APTIC NO. 44294

Schubert, Ralph H. W. and H. Sangl

THE PROBLEM OF LEAD EXPOSURE CAUSED BY THE EXHAUST GASES OF MOTOR VEHICLES. A CONTRIBUTION TO THE APPLICABILITY OF THE DETERMINATION OF DELTA-AMINOLAEVULINIC ACID IN URINE AS A CRITERION FOR THE LEAD EXPOSURE CAUSED BY ENVIRONMENTAL FACTORS. *(Zur Frage der Bleibelastung durch Autoabgase. Ein Beitrag zur Verwendbarkeit der Aminolaevulinsaeure-Bestimmung im Harn als Kriterium fuer die Umweltbedingte Bleibelastung). Text in German. Zentralbl. Bakteriol., Parasitenk. Infektionskr. Hyg. Abt. 1. Orig., Reihe B, 155(5-6):470-475, June 1972. 17 refs.*

A comparative determination was made of the lead concentration in the blood and the delta-aminolevulinic acid excretion in the urine of 127 patrolling policemen, 59 policemen working in offices, and 38 street wardens in the city of Frankfurt am Mein. The average value of the lead concentration in blood in all three groups did not differ significantly. The values reflected the increased lead intake of the city population. The delta-aminolevulinic acid excretion in the urine never exceeded the limit of 10 mg delta-aminolevulinic acid/g creatinine relevant for diagnosis of lead intoxication in occupational medicine. A correlation between lead concentration in blood and delta-aminolevulinic acid excretion in urine cannot be stated in this field of environmental lead exposure. (Author abstract modified)

24447 APTIC NO. 43968

Shishido, Masao, Kido Sugita, Fumio Higuchi, Fumihiko Ohya, Shogo Ochiai, and Takashi Mukaida

RELATIONSHIP BETWEEN THE EFFECT OF PHOTOCHEMICAL AIR POLLUTION ON MAN'S HEALTH AND AGENTS OF AIR POLLUTION (REPORT 2). *(Kokagaku taiki osen ni yoru kenko shogai no jittai to taiki osen yoin to no kankei). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 8(5):465-471, May 1972. 2 refs.*

In Kawasaki city and other counties, an investigation was made of the health of 6914 students of primary, junior, and senior high schools affected by photochemical air pollution. A questionnaire was used. About 95.6% of the students answered that haze occurs in Inada district; 54.3% of the students smelled bad odors in the district of Tajima. The occurrence of the disease had nothing to do with being inside or outside of the building. Exercise did not relate to the frequency of the disease. Ophthalmic diseases occurred most frequently in the Tajima district (99.1%); 63.9% of the students complained of smarting eyes, 66.3% of pains, and 75.7% of tears. Respiratory diseases occurred most frequently in the Nakahara district (81.5%); 40.1% of the students complained of difficulty breathing, 52.3% of throat pains, and 47.2% of cough. Diseases of the circulatory system had an occurrence of 12.4% in the Nakahara district which had the highest frequency. More than 20% of the students complained of tiredness. In the Kohoku district, 43.3% complained of headaches and 17.6% complained of faintness.

24448 APTIC NO. 44379

Simpson, Paul G., Rizwanul Haque, and Ted E. Hopkins

INTERACTION OF POLLUTANT METAL IONS WITH PROTEINS. *In: Annual Progress Report. June 1, 1971 to May 31, 1972. Oregon State Univ., Corvallis, Environmental Health Sciences Center, Center for Environmental Management Proj. 5, p. 32-34, 1972.*

The interaction of methyl mercury with the amino acid side chains of proteins was investigated by x-ray diffraction to establish the detailed structure of methyl mercury derivatives of blocked amino acids. The interaction of methyl mercury chloride and N-acetyl-cysteine was the focus of the study. Crystals of a complex, probably S-methyl mercuric-N-acetyl-L-cysteine, were obtained from an equimolar mixture of the two in a methanol-water solution. Preliminary x-ray studies indicated that these crystals belong to the orthorhombic space group P2(1)2(1)2(1) with unit cell dimensions: a equals 13.09 A, b equals 12.99 A, and c equals 25.28 A. Density, specific rotation, and linear absorption coefficient for molybdenum radiation were determined. A nuclear magnetic resonance study of the methyl mercury chloride interaction with the peptide cysteine residue has been started.

24449 APTIC NO. 44027

Spear, R. C. and E. Wei

DYNAMIC ASPECTS OF ENVIRONMENTAL TOXICOLOGY. *Trans. ASME (Am. Soc. Mech. Engrs.), 94(2):114-118, June 1972. 11 refs.*

There is an increasing need for quantitative forecasts of adverse health effects of chemicals in the environment. The principal sources of data to be used are from toxicological investigations in the laboratory and from sampling studies which estimate the current levels of chemicals in the environment. Following the intake of a chemical into the body, some of the toxicological data will bear on the quantitative description of the sequence of events. These events constitute a dynamic process which is, in principle, amenable to mathematical modeling. The chemical input to such a model is partially defined by the levels present in the environment and by some exposure mechanism which brings the chemical into direct contact with the individual. The approach is that of the control engineer in that it is desired to produce a process model of sufficient validity to allow realistic investigations of strategies for control of the system, that is, a minimization of health hazards. Compartmental models are introduced along with the frequency diagram, which displays quantitative dose-response data. An example is given for the application of these methods to the assessment of the problem of methylmercury in fish. In this method of analysis, it is desired to identify the parameter distribution concept with compartmental modeling. If it is possible to relate one or more of the state variables of the model to a health effect, then it may be possible to forecast the proportion of an exposed population at risk. Even if reliable conclusions are not possible, the attempt to treat the problem in a quantitative format should systematize the existing information and point out the critical gaps in knowledge.

24450 APTIC NO. 44331

Vastag, E., M. S. Islam, and W. T. Ulmer

RELATIONSHIP BETWEEN PRESENT LUNG VOLUME AND AIRWAY RESISTANCE IN HEALTHY SUBJECTS AND IN PATIENTS WITH CHRONIC OBSTRUCTIVE AIRWAY DISEASE. *(Der Zusammenhang zwischen dem aktuellen Lungenvolumen und dem Stroemungswiderstand in den Atemwegen bei gesunden Versuchspersonen und bei Patienten mit chronisch obstruktiver Atemwegserkrankung). Text in German. Pneumonol. (Berlin), 147(1):29-40, June 1972. 31 refs.*

Measurements in 22 healthy subjects and in 24 patients with chronic obstructive airway disease have shown that the volume/flow relationship is more marked by differences between healthy persons and patients under forced respiration than under normal breathing conditions. Following the esophagus pressure, the expiration can be divided between pressure dependent and independent. The airway resistance increases sharply during expiration in healthy persons at vital capacity values below 30%. In patients with chronic obstructive airway disease, critical volume increases with increasing airway resistance and becomes increasingly faint. Experiments with a bronchodilator show that the volume/airway resistance curve is also influenced by the tones of the muscles of the bronchi, the intraalveolar and intrapleural pressures, the lung volume, the elasticity of the lung, and the air flow. These values are in equilibrium; a change in any one of these factors will influence airway resistance. An increase in intrathoracic gas volume and in total capacity is necessary for the ventilation of the alveolar space in patients with chronic obstructive bronchitis. This possibility for compensation has recognizable limits in patients with obstructive airway disease. (Author summary modified)

24451 APTIC NO. 44116

Wolff, V.

ENVIRONMENTAL DANGERS CAUSED BY GAS AND DUST-LIKE EMISSIONS. *(Umweltgefahren durch gas- und staubfoermige Immissionen). Text in German. Oeffentl Gesundheits-Wesen (Stuttgart), 34(6):348-354, June 1972.*

It is a fact that the majority of diseases of the respiratory tract are caused by air pollutants. It is also a fact that air pollutants influence the climate, particularly fog formation, relative humidity, and the quantity of ultraviolet radiation. It is known that the effects of gaseous air pollutants depend on whether they are water soluble, lipoid soluble, or bound to aerosols. If they are water soluble, the gases affect the upper respiratory tract. Nothing is known about lipoid soluble gases. For the medical doctor, it is always very difficult to provide sufficient proof before the law that the symptoms of patients derive from air pollution. The statistical proof, as has been furnished in North Rhine Westphalia in the case of lung cancer, should thus be upgraded as being equal to the proof by logic causality. The various substances defined in the so-called clean air law are less of a threat to public health; the complex effects of individual air pollutants have a greater pathologic significance. It is the responsibility of public health physicians to consider this serious problem so that in the future quantitative statements on the degree of exisitng health danger to the population can be made. (Author abstract modified)

24452 APTIC NO. 44152

Wronska-Nofer, Teresa and Jerzy A. Sokal

THE LEVELS OF THE NICOTINAMIDE-ADENINE DINUCLEOTIDES IN THE TISSUE OF RABBITS AND RATS AFTER CHRONIC EXPOSURE TO CARBON DISULPHIDE. *Int. Arch. Arbeitsmed., 29(2):124-128, 1972. 23 refs.*

The levels of nicotinamide-adenine dinucleotides in the blood and liver of rats and rabbits chronically intoxicated with carbon disulfide were studied. In both species of animals, exposure to CS2 brought about a decrease in the total amount of blood nucleotides and caused an increase of NADPH concentration in the liver. A possible correlation between observed changes in the levels of nucleotides in the liver and disorders in lipid metabolism arising in the course of chronic exposure to CS2 is discussed. (Author summary modified)

24453 APTIC NO. 44077

Yokoyama, Eiji

RESPIRATORY EFFECTS OF NITROGEN DIOXIDE AND OZONE IN THE INDUSTRIAL AND URBAN COMMUNITY ATMOSPHERES. *(Shokuba kankyo oyobi toshi taiki-chu no nisanka chisso oyobi ozon no hai ni taisuru eikyo). Text in Japanese. Nenryo Kyokaishi (J. Fuel Soc. Japan, Tokyo), 51(1):11-18, 1972. 3 refs.*

Sources of nitrogen dioxide and ozone, the occurrence of nitrogen oxides in automotive emissions, and the formation of photochemical smog are reviewed. The physical, chemical, and toxicological properties of NO2 and O3 are compared with those of sulfur dioxide. Nitrogen dioxide and O3 can penetrate the upper respiratory airway more readily than can SO2, and this difference in penetration rate may be one of the causes for the fact that pulmonary damages with relatively high concentrations of NO2 and O3 are different from those of SO2. Nitrogen dioxide poisoning and resistance to tracheal infection are discussed.

24454 APTIC NO. 44167

Yokoyama, Eiji and Robert Frank

RESPIRATORY UPTAKE OF OZONE IN DOGS. *Arch. Environ. Health, 25(2): 132-138, Aug. 1972. 16 refs.*

The uptake of ozone by the surgically isolated upper airways in 11 anesthetized, paralyzed, mechanically ventilated dogs was measured. The gas was administered by nose or mouth, each exposure lasting 20 to 30 min. The relative uptake of O3 was inversely related to concentration and flow rate, and was higher nasally than orally. Changes in nasal flow resistance, induced by aerosols of histamine and phenylephrine hydrochloride, had little effect on the process. The removal of O3 from inspired air by the lower airways and parenchyma was measured in five additional dogs that were mechanically ventilated through a tracheal cannula. The concentration ranged from 20 to 85 pphm, the tidal volume was constant, and the pump frequently was 20 or 30 cycles/min. Under these circumstances, the rate of uptake varied between 80% and 87%. (Author abstract modified)

24455 APTIC NO. 44395

Zielhuis, R. L.

INDUSTRIAL MEDICINE AND ENVIRONMENTAL HEALTH. *(Bedrijfsgeneeskundig onderzoek geleid door het milieu-buiten-de-poort). Text in Dutch. Tijdschr. Soc. Geneesk., 50(2):34-40, 47, Jan. 1972. 21 refs.*

The tasks priorities of the occupational physician are outlined with regard to environmental hygiene. By combining their observations of workers with the investigation of the ambient environment, occupational physicians will gain deeper insight into the public health effects of environmental factors with regard to the health of workers. Possibilities of such an approach, and basic fields on which investigations should focus, are described. Carbon monoxide, for which a maximum allowable hour concentration of 50 ppm, corresponding to a CO hemoglobin level of 8%, is required, may cause arteriosclerosis. Rabbits exposed to CO fo over 8 weeks (10-15% of COHb) developed aterial arteriosclerosis. Arteriosclerotic patients had higher COHb levels than healthy individuals. Inhaled asbestos is capable of producing pleural or peritoneal mesothelioma, particularly in aged persons. Lead, even in small amounts, reduces the delta-aminolevulinic acid dehydratase activity and the metabolism of tryptophan. Animals exposed chronically to lead had shorten lives as compared to the control group, and lead concentrations in their tissues were largely the same as in the population in the U. S.

EFFECTS-PLANTS AND LIVESTOCK

24456 APTIC NO. 43782

Briggs, D.

POPULATION DIFFERENTIATION IN MARCHANTIA POLYMORPHA L. IN VARIOUS LEAD POLLUTION LEVELS. *Nature (London), 238(5360):166-167, July 21, 1972. 7 refs.*

A preliminary study of lead levels in populations of the liverwort Marchantia polymorpha L. is presented. The liverwort is relatively common in most shady streets in the center of Glasgow and Edinburgh and is also found in country districts. Eleven samples of Marchantia and the soil 1 to 2 cm beneath them were collected along a transect running north-west from central Glasgow to a point 13 km from the city. The lead content of plant digests and soil extracts was determined by atomic absorption spectrophotometry. High lead levels were found in Marchantia and in soils from the centers of Glasgow and Edinburgh, and in samples from Chatsworth, Dunoon, and Beattock which are away from large urban areas but near roads. There was usually a greater concentration of lead in the liverwort than in the soil, and high levels of lead in the Marchanti thalli were usually associated with high lead values in the soil. Four populations were studied to see if plants are differentially sensitive to lead in the medium. The three city clones grew equally well on lead agar and control medium, but the Milngavie plants, which grow in an area exposed to less lead contamination, grew significantly less well on lead agar in comparison with the control. It seems likely that lead tolerant genotypes have a selective advantage in city regions. Marchantia polymorpha, which contains higher lead levels than the bryophytes used in previous studies, could perhaps be a valuable indicator species.

24457 APTIC NO. 43895

Draznin, Yaffa

THE LETHAL EQUATION: SMOG PLUS TREES EQUALS DAMAGE AND DEATH. *Amer. Forests, 78(2):48-51,58-60, Feb. 1972*

Plants are so sensitive to smog that they are proven monitoring devices for detecting pollutants in the air; except for the toxic gases carbon monoxide and hydrogen sulfide, they react to pollutants long before humans do. The villain in the matter is the automobile, a major source of the raw materials from which smog is produced. Industrial plants that burn organic fuels are also to blame. Ozone and peroxyacetyl nitrate are two very lethal products of the photochemical reaction which takes place when hydrocarbons and nitrogen oxides are acted on by bright sunshine. Smog damage is most extensive during periods of soft, luxuriant plant growth; plants maintained with just enough water and nutrients to keep from wilting manage better than well-watered, well-fed vegetation. One way plants seem to be coping is through the development of new and more numerous smog-resistant varieties, or individuals within the varieties. Du Pont and Shell Development Corporation are developing a spray or dust for external application to prevent damage to leaves at times when they are most susceptible.

24458 APTIC NO. 44071

Ganje, T. J. and A. L. Page

LEAD CONCENTRATIONS OF PLANTS, SOIL, AND AIR NEAR HIGHWAYS. *Calif. Agr., 26(4):7-9, April 1972*

Lead found in and on crops in highway proximity tests in Southern California was caused principally by aerial depsoition. Substantial amounts of lead were removed from exposed plant tissues by distilled water washing. Amounts of lead in and on crops were influenced by distance from the highway, extent of plant surface exposed, external plant characteristics, duration of plant exposure, motor vehicle traffic density, and direction of prevailing winds. In soils and suspended air particulates, lead concentration was influenced by distance from highways and the direction of prevailing winds. Crops surveyed included lima bean, corn, sugar beet, tomato, wheat, alfalfa, and oranges.

24459 APTIC NO. 44574

Jaeger, Hans-Juergen and Edwin Pahlich

INFLUENCE OF SO2 ON THE AMINO ACID METABOLISM OF PEA SEEDLINGS. *(Einfluss von SO2 auf den Aminosaeurestoffwechsel von Erbsenkeimlingen). Text in German. Oecol., 9(2):135-140, 1972. 10 refs.*

Long-termed fumigation of pea seedlings with sulfur dioxide caused typical alterations of the concentration of free glutamate and glutamine as well as fluctuations of the activity of glutamate dehydrogenase and glutamine synthetase. Shortly after fumigation with low concentrations of SO2 began, the amount of glutamate increased, while the concentration of glutamine increased independently of the concentration of SO2. The activity of glutamate dehydrogenase, reductive amination of alpha-ketoglutarate, generally increased. In roots of fumigated seedlings the effects of SO2 on the concentration of glutamate and glutamine as well as on the activity of glutamate dehydrogenase are similar to those observed in shoots. Metabolic sequences derived from glutamate seem to be activated by SO2 as can be seen by the increase of the concentration of glutamine and gamma-aminobutyric acid.

24460 APTIC NO. 43721

Lee, J. A.

LEAD POLLUTION FROM A FACTORY MANUFACTURING ANTI-KNOCK COMPOUNDS. *Nature, 238(5360):165-166, July 21, 1972. 9 refs.*

In a study of the edaphic factors affecting certain grassland communities in Cheshire, significant lead levels were found in vegetation in the vicinity of a factory manufacturing anti-knock compounds which consist of tetraethyl and tetramethyl lead. Moss species found in abundance at the sample sites were collected and their mean lead content was taken as a measure of the lead accumulated in the ground layer. At sites where three or more species were sampled there was fairly good correspondence in the lead content of the species. Samples of Holcus lanatus were also taken. There was a rapid decline in the lead concentration in the vegetation away from the factory in the first 400 m and a slower decline in the next 400 m. At 800 m, however, the amount of lead in the mosses was between two and three times that in the same species collected in rural areas far from any industry. Concentrations as great as 286 ppm were observed in a pasture downwind of the factory; this was nearly three times as much as in roadside samples from central Manchester. A sample of Holcus lanatus from immediately outside the factory had a lead content of 1838 ppm. Some of the contents recorded in Holcus lanatus are likely to be highly toxic to herbivores.

24461 APTIC NO. 44345

Leonard, C. D. and H. B. Graves, Jr.

EFFECT OF FLUORIDE AIR POLLUTION ON FLORIDA CITRUS. *Fluoride, 5(3):145-163, July 1972. 15 refs.*

The effect of different concentrations of fluorides in the leaves on the yield and quality of Valencia and Hamlin oranges and Marsh seedless grapefruit was studied. Under Florida conditions, exposure of citrus trees to relatively high levels of airborne fluorides during spring bloom period is believed to cause the greatest losses in fruit production. This in indicated by the significant reduction in yield of Hamlin oranges by each of three different concentrations of hydrogen fluoride sprays applied only three different times during the 1967 bloom period. Where the concentration of airborne fluorides is high enough during the bloom period to cause extensive leaf chlorosis, leaf burn, dropping of young leaves, and excessive dropping of bloom and small fruit, the mechanism causing yield reduction is obvious. Heavy drop of young leaves, bloom, and small fruit as a result of exposure to high levels of airborne fluorides, however, has occurred in relatively few Florida citrus groves. These symptoms of acute or severe fluoride toxicity did not occur on the trees in greenhouse experiments. In spray experiments, leaf burn and dropping of young leaves occurred only moderately when the highest concentration of HF sprays was applied while the trees has an extensive new flush of immature leaves. No dropping of young leaves nor excess dropping of bloom and small fruit occurred during the bloom period in the first three years of the spray experiments. Decrease in photosynthetic activity due to smaller leaf size and inhibition of chlorophyll synthesis probably accounts for much of the decrease in yield. The addition of urea to high managanese sprays for regreening of fluoride-chlorotic leaves appears to increase the absorption of Mn by the leaves over similar high Mn sprays with urea.

24462 APTIC NO. 44295

Oelschlager, W.

DETERMINATION OF FLUORIDE STANDARDS FOR VEGETATION AND ANIMALS. *Fluoride, 5(3):111-114, July 1972. 1 ref.*

In determining fluoride emission standards with respect to possible damage to vegetation, better results are obtained if gaseous fluoride is considered exclusively. However, in evaluating damage to animals, fluoride uptake in gaseous or through respiration is negligible compared with uptake through forage, soil, and fly ash. Soil and fluoride, emitted with fly ash near factories, is attached to raw forage such as grass, clover, and alfalfa. Since the amount of fluoride in soil is approximately 20 to 150 times as high as the fluoride content of forage and that of fly ash is more than 1000 times as high, the question arises as to whether or not the solid particles should be considered when measuring emissions. When nearly identical supplements of fluoride, namely 72 ppm, in the form of soil, sodium fluoride, and fly ash from an aluminum factory smelter, were administered to cattle, the fluoride uptake from soil was 0.7 times, from fly ash 1.4 times, and from sodium fluoride 3.0 times as high in the experimental animals as in those which received the fluoride supplement. The utilization of fluoride derived from soil in ruminant animals is highly variable depending on the origin of the soil. The fluoride from soil and fly ash is more or less available, although at lower magnitudes, than fluoride contained in forage. However, if for establishing emission standards, particulate fluoride in addition to gaseous fluoride is being considered, values can be obtained which are not in accord with the possible damage to animals. Thus, damage to health may be more extensive with a relatively low gaseous emission than with a high level depending on the proportion of fluoride in the gaseous and particulate form. As a maximum value for fluoride content of forage, 40 ppm/day is being considered for high productive cattle. This value, however, is not only reached, but occasionally substantially exceeded, in non-polluted areas, because of the top permissible fluoride levels in phosphate-containing feed.

24463 APTIC NO. 43736

Platou, Jan

USE SULFUR IN FERTILIZERS. *Hydrocarbon Process., 51(7):86-88, July 1972.*

Examples of modern, high-analysis fertilizer materials are ammonium nitrate, diammonium phosphate, urea, and triple superphosphate. The consequences of this change in types of fertilizer are appearing in many parts of the world, in the form of sulfur deficiency of crops. Without sulfur, protein cannot form, and life as we know it could not exist. Considerable development work has been carried out on incorporating plant nutrient sulfur in the modern, high-analysis fertilizer materials. Since elemental sulfur must be oxidized to sulfate before it can be used by plants, it is important to ensure that this oxidation takes place as rapidly as possible in the soil. The smaller the particles of elemental sulfur, the more rapidly are they oxidized to sulfate. Since finely divided sulfur is difficult to handle, much work has gone into developing a granular product which will disintegrate readily in the soil. Several sulfur fertilizers are mentioned, as well as the potential market for sulfur in agriculture, the effect of pollution abatement regulations, and sulfur-coated urea. Reduced sulfur emissions will contribute to sulfur deficiency.

24464 APTIC NO. 43787

Wu, Lin and A. D. Bradshaw

AERIAL POLLUTION AND THE RAPID EVOLUTION OF COPPER TOLERANCE. *Nature (London), 238(5360):167-169, July 21, 1972. 10 refs.*

The copper tolerances of 30 individual genotypes of each of four populations of the grass Agrostis stolonifera from the area of a metal refining industry emitting large amounts of copper dust and two populations from uncontaminated grassland were measured. In the population on the boundary of the refinery area there is a considerable increase in the occurrence of tolerence, yet this population is more or less continuously distributed and there are several other species; this supports the idea that selection of different genotypes for copper tolerance from an original non tolerant population is only occurring now. Tolerances of populations from a dune grassland and a park at some distance from the refinery had uniformly low tolerance. In a separate experiment, seeds were collected from the dune grassland, a zinc and lead mine, a normal pasture, another lead mine, boundary grassland at the refinery, and grassland near a canteen at the refinery. The seeds were sown on toxic soil from the refinery containing 10,260 ppm Cu. After 10 weeks, mean height and percentage of rooted seedlings were determined in samples of 2000 seeds for each population. There was no difference in the height and the percentage of rooted seedlings between the four seed populations collected from sites not contaminated by copper when grown on refinery soil; but there was a significant increase in the mean height and percentage of rooted seedlings in the two refinery populations. Although most of the seedlings from uncontaminated sites died after the experiment, some survived well. These seedlings seem to be tolerant and may give rise to a tolerant subsequent generation.

EFFECTS-MATERIALS

24465 APTIC NO. 44123

Asanuma, Toshitada

CORROSIVE CONDITIONS OF PIPING OF HYDROGENATION SYSTEMS. *(Suiten datsuryu sochi no haikan no fushoku jokyo ni tsuite). Text in Japanese. Haikan Gijutsu (Piping Eng.), 14(4):138-158, April 1972.*

A general discussion on the corrosion of pipings of a hydrodesulfurization system is given. Low-alloy steel such as 5% molybdenum steel and 5% chromium steel are usually used for piping at the high-temperature part and carbon steel for piping at the lower-temperature part. It has been found that 5% Cr steel piping used in a kerosene purifying apparatus at higher than 300 C has a maximum corrosive rate of 0.38 mm/yr, while carbon steel piping used in a naphtha purifying apparatus at lower than 100 C has a maximum corrosive rate of 0.4 mm/yr. There is considered to be no difference between carbon steel and low-alloy steel regarding the effect of Cr content on corrosion by high-temperature hydrogen sulfide; however, it is believed that steel of more than 10% Cr is more corrosion resistant. The corrosions occurring at water supply lines and drain lines are discussed and shown graphically.

24466 APTIC NO. 43911

Beisker, Heinz

THE SLOW DEATH OF THE BRONZES. ***(Der langsame Tod der Bronzen). Text in German. VDI (Ver Deut. Ingr.) Nachr. (Berlin), 26(22): 20, May 1972.***

On the initiative of the VDI-committee for keeping the air clean, an investigation concerning the influence of corroding air pollutants on bronze works of art has been undertaken. More than 100 sculptures found in the open air without protection against harmful substances in the air were examined. An analysis is given of normal city air which contains about 2 mg/cu m of dust and soot, rising to 1000 µg/cu m in industrial centers, so that the monthly dust quantity in a city amounts to 870 tons. As the major part of the sculptures are situated in the centers of the cities, they are submitted to the strongest pollutants, consisting of sulfur dioxide contained in the exhaust gas of cars and of the emissions from domestic heating systems and power generating plants. These emissions cause corrosions forming deep holes in the bronze which may destroy large areas of the sculpture. However, an amelioration of the situation may be expected from preventive air pollution measures.

24467 APTIC NO. 43780

Ikezawa Y., Y. Yoshida, S. Kitani, and M. Kozuka

STUDIES ON WEATHERING OF IMPREGNATED CHARCOALS USED IN REACTOR FILTER SYSTEMS. *(Genshiro yo kasseitan firuta no keiji kenka ni kansuru kenkyu). Text in Japanese. Kuki Seijo (Clean Air - J. Japan Air Cleaning Assoc., Tokyo), 10(2):71-78, June 1972. 11 refs.*

Four kinds of impregnated charcoals were studied for the atmospheric weathering and static weathering effects on their collection abilities for radioactive methyl iodide. The charcoals are packed in five parallel cartridges in a 5 cm thick filter, each cartridge is 3 cm in inside diameter and 1 cm in thickness. Nitric oxide, nitrogen dioxide, and sulfur dioxide are used individually or as a mixture for the static weathering study. For the atmospheric weathering, air at 15-25 C and relative humidity 40-60% is passed through the filter with different charcoal for a period of 40 days and 120 days. Remarkable deterioration of the charcoals at the first cm, regardless of the kind of charcoal, was seen. The collection efficiency drops approximately 10% after the air is passed at 25 cm/sec for 2.4 to 11 months for 5 cm thick filter. The static weathering effects at 50% relative humidity on the collection efficiency are small compared to the atmospheric weathering effects.

24468 APTIC NO. 43854

Jack, John R., Ernie W. Spisz, and John F. Cassidy

THE EFFECT OF ROCKET PLUME CONTAMINATION ON THE OPTICAL PROPERTIES OF TRANSMITTING AND REFLECTING MATERIALS. *Preprint, American Inst. of Aeronautics and Astronautics, New York, 6p., 1972. 6 refs. (Presented at the American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 10th, San Diego, Calif., Jan. 17-19, 1972, Paper 72-56.)*

Preliminary results are presented of plume contamination from a 5- pound thrust single-doublet, bipropellant rocket engine on the transmittance of quartz and the reflectance of a silicon monoxide overcoated aluminum mirror. Changes in quartz transmittance were found to be significant and were due to both absorption and scattering effects. Contaminant absorption effects were predominant at the short wavelengths and scattering effects were greatest in the visible wavelengths. Measured changes in mirror reflectance were due primarily to contaminant absorption. Scattering effects were as much as 9% of the total reflected energy from the mirror. There were no noticeable chemical or erosion effects on either the quartz or the front surface mirror. The experimental program was carried out in a 6 by 12-ft liquid helium-cooled space simulation chamber. (Author abstract modified)

24469 APTIC NO. 44300

Miller, Paul D., Horatio H. Krause, Dale A. Vaughan, and Walter K. Boyd

THE MECHANISM IN HIGH TEMPERATURE CORROSION IN MUNICIPAL INCINERATORS. *Corrosion, 28(7):274-281, July 1972. 21 refs.*

Chemical analyses, electron microprobe surveys, and x-ray diffraction examinations of deposits and corroded metal surfaces from corrosion probes exposed in operating municipal incinerators have helped explain the attack observed. In addition, low melting chlorine and sulfur-containing salts contribute to the corrosion. The reactions of chlorine with steel are important in the temperature range between 204 and 316 C, and both hydrogen chloride and chlorine cause corrosion at higher temperatures. Reactions of sulfur-containing compounds can cause corrosion over a wide range of temperatures. The techniques used to analyze the deposits and corroded specimens are outlined, and a discussion is presented of corrosion mechanisms. (Author abstract modified)

24470 APTIC NO. 44509

Spence, J. W. and F. H. Haynie

PAINT TECHNOLOGY AND AIR POLLUTION: A SURVEY AND ECONOMIC ASSESSMENT. *Environmental Protection Agency, Research Triangle Park, N. C., National Environmental Research Center, Office of Air Programs Pub. AP-103, 44p., Feb. 1972. 65 refs.*

NTIS: PB210736

Technical developments within the paint industry with application to characteristics of pollutant attacks on exterior paints were surveyed. The specific effects of hydrogen sulfide, sulfur dioxide, ozone, and particulates on exterior finishes were considered. Hydrogen sulfide attacks in-service exterior house paints, causing discolorations and darkening. Sulfur dioxide attacks result in film deterioration and can increase the drying and hardening times of certain paint systems. Agglomeration of particulates causes loss of aesthetic attractiveness and chemical degradation of film. Chemical damage to four classes of exterior paints, i. e., household, automotive refinishing, coil coating, and maintenance, was assessed for economic losses. The total estimated cost at the consumer level is over $0.7 billion/yr. Household paint sustains the most damage, representing over 75% of the total dollar loss. (Author abstract modified)

24471 APTIC NO. 43933

Suzuki, Ryoji

CORROSION OF AIR CONDITIONER PIPING BY AIR POLLUTION. *(Taiki osen ni yoru kucho haikan no fushoku). Text in Japanese. Haikan (Piping), 7(4):59-63, April 1972. 4 refs.*

Sulfur oxides in air are believed to be responsible for the corrosion of piping in air conditioners. The corrosion occurs electrochemically on the surface of iron, as a result of which ferric hydroxide is formed. Experimental results have shown that the corrosion of iron is promoted remarkably at pH lower than 4 and higher than 13. The cooling water used in urban area is largely affected by the SO2 content of air and usually has a pH between 3 and 5. For good maintenance of an air conditioner, a pH meter should be attached to it. High-pH water can be either changed or treated with chromates, polyphosphate, etc. Distilled water, which contains more chlorine gas and is, therefore, more acetic, also causes corrosion of piping in steam heating systems.

EFFECTS-ECONOMIC

24472 APTIC NO. 44374

U. S. CHEMICAL INDUSTRY DOUBLES EXPENDITURE FOR ENVIRONMENTAL PROTECTION. *(US-Chemie verdoppelt die Aufwendungen fuer den Umweltschutz). Text in German. Chem. Ind., 24(7):424, July 1972.*

Some figures on the expenditure for environmental protection in the U. S. chemical industry during the period 1972-1975 are presented. The total outlay of 175 companies, members of the Manufacturing Chemists Association, will be some $1.34 billion, compared to a sum of $1.3 billion spent until now. The money spent on research rose from $38.4 million in 1965 to $46.7 million in 1971. Investments for air pollution control projects until 1971 totaled $500 million, and $591 million more will be spent during the period 1972-1975. The operating costs of air pollution control equipment rose from $24 million/yr in 1962 to $77 million/yr in 1971. The outlays for research and development in the air pollution area rose from $2.8 million to $18.6 million during the same period.

24473 APTIC NO. 44616

Kohn, Robert E.

A COST-EFFECTIVENESS MODEL FOR AIR POLLUTION CONTROL WITH A SINGLE STOCHASTIC VARIABLE. *J. Amer. Stat. Assoc., 67(337):19-22, March 1972. 11 refs.*

A cost-effectiveness model for air pollution control is constructed in which the total cost of abatement is minimized for a given set of air quality goals and for varying degrees of confidence that the goals will be achieved. The linear programming model incorporates the projected air pollution control technology in the St. Louis Airshed for the Year 1975. The probabilistic element is confined to a single stochastic variable, annual average wind velocity. While this is a simplified model, the cost of increased certainty is indicated to rise rapidly. This suggests that air quality goals should be expressed not only in terms of maximum pollutant concentrations but also the minimum probabilities that these maximums will not be exceeded. Allowable emission flows and the corresponding cost of pollution control in 1975 are given for carbon monoxide, hydrocarbons, nitrogen oxides, sulfur dioxide, and particulates. (Author abstract modified)

24474 APTIC NO. 44648

Watson, Donald E.

GOALS OF COST-BENEFIT ANALYSIS IN ELECTRICAL POWER GENERATION. *In: Risk vs. Benefit Solution or Dream. Los Alamos Scientific Lab., N. Mex., Rept. UC-41, UC-80, p. 50-53, Feb. 1972. 4 refs. (Presented at the Western Interstate Nuclear Board Symposium, Los Alamos, N. Mex., Nov. 11-12, 1971.)*

NTIS: LA-4860-MS

Cost-benefit analysis is a promising vehicle for promoting meaningful communication between the technological and the public policy-making communities. The realization of this potential depends on the realistic assessment of the goals and limitations of cost-benefit analysis. Risk acceptability evaluation is distinguished from risk evaluation and is considered to be relevant to the overall goals of cost-benefit analysis. The public might over-react to proposed projects, despite small intrinsic risks, because there is no intuitive familiarity for phenomena which have not been experienced. The disparity between intrinsic and extrinsic risk values can be reconciled by positive attempts to inform the public, with the goal of increasing the public's familiarity with risks. As an example of the use of comparative risk evaluation, the risks of carcinogenesis from fossil-fueled and nuclear power generation are compared. Despite considerable uncertainty in establishing the magnitude of the risks, current levels of pollution from fossil-fueled power plants constitutes a risk that is probably considerably higher than that from projected nuclear power plants.

STANDARDS AND CRITERIA

24475 APTIC NO. 44310

Ministry of Health and Welfare, Tokyo (Japan), Dept. of Public Nuisance

DATA RELATED TO THE AIR POLLUTION CONTROL LAW MINISTRY ORDINANCES (NO. 3). POLLUTANTS STANDARDS SPECIFIED BY ORDINANCES. *(Taiki osen boshiho seishorei kankei shiryo (no. 3). Jorei no yoru yagai busshitsu no kisei jokyo nado). Taiki Osen Nyusu (Air Pollution News), no. 69:2-11, March 1972.*

Japanese local emission standards, based on air pollution control laws, are presented in tables. Standards for sulfur oxides, ammonia, chlorinated hydrocarbons, hydrogen cyanide, nitrogen dioxide, hydrogen sulfide, lead, zinc, sulfur dioxide, copper compounds, cadmium, cyanice compounds, phosphorus compounds, and hydrofluoric acid are presented for each Prefecture. The areas of central cities where sulfurless fuel should be used are discussed. The air quality standards of many countries for SO2 and dust concentrations are presented.

24476 APTIC NO. 44311

Ministry of Health and Welfare, Tokyo (Japan), Dept. of Public Nuisance

DATA RELATED TO THE AIR POLLUTION CONTROL LAW MINISTRY ORDINANCES (NO. 4). SO2 AND SOOT EMISSION STANDARDS AND THE PRESENT CONDITION OF INCINERATORS. *(Taiki osen boshiho seishorei kandei shiryo (No. 4). SO2 baijin no kinjunchi oyobi gomi shokyakuro no genkyo nado). Text in Japanese. Taiki Osen Hyusu (Air Pollution News), no. 69:12-21, March 1972.*

Japanese local emission standards for soot and smoke are applied to a broader area, which is presented in a table. Each device, such as boiler hearths, has emission standards for soot and smoke. The present conditions of the total number of incinerators and their capacities are presented. The charts showing the distribution of frequencies of the height of stacks are presented. The number of incinerators and capacities in each Prefecture are presented. The investigative results of dust collectors on the market are presented.

24477 APTIC NO. 44392

OFFICIAL GAZETTE. *(Kanpo). Text in Japanese. Kanpo (Off. Gaz.), no. 13628:3-4, May 30, 1972.*

Standards for five odors and equations for calculating flow rates of ammonia, hydrogen sulfide, and trimethylamine are given. The standards for ammonia in air are 1 ppm-5ppm; for methylmercapta 0.002 ppm-0.01 ppm; for H2S 0.02 ppm-0.2 ppm; for methyl sulfide 0.01-0.2 ppm; and for trimethylamine 0.005 ppm-0.07 ppm. The effective data of the regulation is May 31, 1972.

24478 APTIC NO. 44173

Hunziker, Richard

FUEL OIL AND ENVIRONMENTAL PROTECTION. *(Heizoel und Umweltschutz). Text in German. Chem. Rundschau (Solothurn), 25(11):301,303, March 1972.*

At the combustion of fuel oil sulfur dioxide develops along with the combustion products carbon dioxide, and water. If the flame is not adequately adjusted, soot, unburned oil particles, and carbon monoxide are emitted into the atmosphere. Sulfur dioxide is harmful for plants at much lower concentrations than for humans and animals. The Swiss Commission on Air Hygiene, therefore, based its recommended SO2 limit concentrations on plant growth. The average half-hourly SO2 limit concentration between March and October has been set to 0.3 ccm/cu m and from November to February 0.5 ccm/cu m. This includes a high safety margin for humans and animals. No vegetation injuries by SO2 have ever been reported for Switzerland. Presently the two types of fuel oil contain an average amount of sulfur of 0.37% by weight and 1.25% by weight. The Swiss Bureau of Environmental Protection suggested the further reduction of the sulfur concentration until Jan. 1, 1974 to 0.3 and 1.25% by weight. The other emissions from oil-fired heaters, such as soot and unburned oil particles, can be easily avoided by proper adjustment of the burners. In Switzerland, experts are being made available help with the proper adjustment of oil burners.

24479 APTIC NO. 44377

Kato, Keiji

THE PRESENT POLLUTION CONTROL STANDARDS INDEXES (AIR POLLUTION). *(Genjo ni okeru kogai kisei suchi (taiki kankei). Text in Japanese. Kagaku Kogyo (Tokyo), 23(9):1194-1202, Sept. 1972.*

A general review is given on the air pollution control standards in Japan. Three categories of pollutants, sulfur oxides, particulates, and harmful substances, such as carbon monoxide, have been subjected to control, and the standards are established. The sulfur oxides emission standards are determined by an equation which consists of two factors, the effective stack height and a district dependent parameter K. The present K values of different districts vary from 7.01 to 18.7. The national environmental standard of particulates is stated by the following two conditions, the hourly average concentration for 24 consecutive hours must be under 0.10 mg/cu m, and the hourly concentration must be under 0.2 mg/cu m. The conditions for CO are: an hourly average for 8 consecutive hours under 10 ppm. The emission standards of other harmful substances, such as cadmium compounds, lead compounds, chlorine and hydrogen chloride, fluorine and fluoro compounds, are also listed.

24480 APTIC NO. 44642

Lemke, Eric E., John E. Williamson, and Herbert Simon

THE EVOLUTION OF A COMPREHENSIVE SET OF PARTICULATE RULES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 24p., 1972. (Presented at the Air Pollution Control Association, Annual Meeting, 65th, Miami, Fla., June 18-22, 1972, Paper 72-92.)*

The Los Angeles County Air Pollution Control District utilizes three different but related control rules for the control of particulate emissions. First, highly visible effluent plumes such as smoke and submicron particulates are controlled by two rules which complement each other. A particulate matter control rule has been developed to restrict the concentration of particulate matter in the effluent in grains/standard cu ft of dry gas. This rule establishes a decreasing allowable grain loading with increasing effluent volume. The volume is calculated as dry gas at standard conditions. The other particulate matter control rule limits the mass emission rate in lb/hr. The mass emission rate rule requires an increase in collection efficiency as the weight of materials processed in a specific operation increases. (Author abstract)

LEGAL AND ADMINISTRATIVE

24481 APTIC NO. 43784

ENVIRONMENTAL PROBLEMS IN THE FOS-BERRE AREA. *(Problemes d environnement dans le secteur Fos-Berre). Text in French. Tech. Moderne, 54(5):27-28, May 1972.*

The environmental protection program set up for the Fox-Berre industrial area accommodating petroleum refineries and power plants is outlined. A monitoring network, designed for sulfur dioxide concentration measurement, will be completed and automated. The SO2 emissions will be reduced in the case of high pollution levels, and standards limiting the daily average SO2 discharge by refineries and consumers will be imposed in 1973. The action program elaborated for 1972 includes thorough studies of local meteorological conditions, soil-surface concentrations, model experiments, diffusion studies by means of radioactive tracers, and investigations into the effects of pollution on vegetation in the industrial area. A pilot plant designed for smoke desulfurization studies will be completed in 1972. Smoke desulfurization will be applied to a 250 MW-power plant to be built at Fos. Though required stack heights are specified stack heights in the Fos-Berre area are limited due to the proximity of aeronautical facilities, which may prevent certain types of industry from settling in this area.

24482 APTIC NO. 43818

ENVIRONMENTAL PROBLEMS AS ENCOUNTERED IN THE PAST. *(Miljoproblemerne er ikke af ny dato). Text in Danish. Dansk Ind., no. 6:22-23, June 1972. 1 ref.*

Environmental problems as encountered in England and Denmark in the past are documented in a few clippings. Limitation of the smoke emissions from plant stacks in England was imposed as early as the second half of the 16th century. A smoke act, issued in England in 1854, required smokes to be burned or otherwise eliminated. This act applied to steam boilers, industrial plants, and steam ships alike. Problems of urban air pollution, and the effects of air pollution on factory workers and on the neighborhood were repeatedly studied during the second half of the 19th century. A Smoke Abatement Exhibition was held in Manchester in 1911 and another international exhibition in London in 1912.

24483 APTIC NO. 44219

ENVIRONMENTAL PROTECTION REQUIRES NEW THINKING. *(Umweltschutz erfordert Umdenken). Text in German. Metall (Berlin), 26(7):763, July 1972.*

General problems of environmental protection and international cooperation in this area are reviewed. Ecological impacts of economic and technical activities should have priority above economic expansion. The initial steps in an environmental program have been taken recently in West Germany. Emission standards have been imposed, and the lead content in gasoline has been limited to 0.04 g/l since January 1972, with a further reduction to 0.15g/l to take effect in 1976. International cooperation in matters of environmental protection, including the specific problems of underdeveloped nations, is a necessity. An environmental alarm and information system will be set up in a joint effort of 22 nations belonging to the Organization for Economic Cooperation and Development (OECD).

24484 APTIC NO. 44256

Japan Chamber of Commerce and Industry, Bureau of Industrial Pollution Information

REPORT ON ACTIVITIES OF BUREAU OF INDUSTRIAL POLLUTION INFORMATION. *(Sangyo Kogai sodanshitsu jigyo hokokusho). Text in Japanese. 43p., April 1972.*

In April of 1972, 651 cases of consultation on pollution including technical and regulation problems were conducted, of which 83 cases were field consultations. The technical problems included the removal of particulates in flue gas from pot furnaces, the detection of vapor formation from polyvinyl chloride decomposition, the prevention of smoke from a furnace burning waste oils and fats, the treatment of the sludge in waste water from the dye, and the intermediate manufacturing process. The regulation problems include the toxic substances defined by government standards.

24485 APTIC NO. 44271

PROTECTION OF THE ENVIRONMENT BY THE FARBWERKE HOECHST AG. *(Umweltschutz bei der Farbwerke Hoechst AG). Text in German. Chem. Rundschau (Solothurn), 25(31):989, Aug. 1972.*

Since 1961 the Farbwerke Hoechst has had a special department for the maintenance of clean water and air. One of the tasks of the department is the daily control of air and water within the plant and in the neighborhood. A rotating television camera on top of the administrative building monitors all emissions. Highly sensitive measuring units with accuracies of 1/100 mg/cu m measure the air composition. Four measuring stations are set up on the fringes of the plant, two are installed on top of high-rise buildings. Test plants are exposed on the roofs(00 of the measuring stations. They are important because they react much faster to air pollutants than man. The 250,000 measurement results which are available every year have revealed time and again that the maximum allowable concentrations are by far not reached. The average sulfur dioxide concentration in the air is about 0.1 mg/cu m. The largest problems are not toxic gases but odors. There are gases 1 cu cm of which distributed over the area of 25 homes can still be smelled. A smog alarm plant for the plant has also been worked out. Luckily it had not to be used once.

24486 APTIC NO. 44319

Fukuyama Municipal Government (Japan)

A SUMMARY OF POLLUTION COUNTERMEASURES. *(Kogai taisaku no gaiyo). Text in Japanese. 147p., March 1972.*

Pollution countermeasures in effect in Fukuyama since 1958 are reviewed. The budget for pollution control and basic principles, regulations, personnel, method of pollution monitoring, loan system for pollution control, measurement of soot, dust, gas, dirty water, odor, noise, and vibration are discussed. Data from questionnaires sent to 43 persons in November and December 1971 indicate that people are aware of pollution problems. An agreement has been reached between the city of Fukuyama and the Nihon Kokan and Fukuyama Kyodo Karyoku companies for emission standards which include sulfur oxides, soot and smoke, particles, toxic gas, odors, and nitrogen oxides. In the city, there are 24 locations to measure pollutants using devices such as deposit gauges, sulfur oxide automatic meters, carbon monoxide automatic meters and wind velocity meters. Monthly dust measurements at 15 locations are shown in tables and graphs. Dust levels at the 15 locations during 1971 averaged 6.05 ton/sq km/month. There is more dust fall in warm weather than in the cold season. Monthly values of sulfur oxide gases at the same 15 locations are also shown in tables and graphs. In 1971, the average sulfur oxides gas level at the 15 sites was 0.65 mg/day/100 sq cm lead peroxide. Wind direction and carbon monoxide were measured too.

24487 APTIC NO. 44337

A MAGNA CARTA FOR THE ENVIRONMENT: PRINCIPLES OF THE DECLARATION ON THE HUMAN ENVIRONMENT. *Surveyor - Local Govt. Technol., 139(4176):39-40, June 23, 1972.*

The principles of the Declaration on the Human Environment, to be respected by all governments, are presented. They provide for racial and national equality in enjoying a better environment. They also provide for better future conditions for future generations. Their main concerns are the conservation, restoration, and improvement of natural resources, with special attention being given to the non-renewable resources. The principles also deal with measures of protection against toxic substances in quantities hazardous to human health and welfare, with emphasis on sea pollution. The economical aspect is considered, with emphasis placed on the principles to be applied to ensure economic and social development in all countries. The political factor is also outlined. Demographic policies, without prejudice to human rights and demanded by the governments concerned, should be applied in regions where the population growth rate or excessive population concentrations are likely to have adverse effects on environmental development, or where low population density may prevent improvement of the environment and impede development. Institutions must be entrusted with the task of planning, managing, or controlling environmental resources. Science and technology must be applied to the identification, avoidance, and control of environmental risks, and their solution. Education must broaden the individual's horizon with knowledge leading to a responsible conduct. Scientific research must be promoted in all countries, especially in the developing ones, on terms which would not constitute a financial burden. All states must cooperate to further develop the international law regarding liability and compensation for the victims of pollution. International matters should be handled in cooperation with all countries on an equal footing, through multilateral or bilateral arrangements in a way respecting the sovereignty and interests of all states. States shall ensure that international organizations play a dynamic role for the protection and improvement of the environment.

24488 APTIC NO. 44342

OFFICIAL GAZETTE. *(Kanpo). Text in Japanese. Kanpo (Off. Gaz.), no. 13628:2, May 30, 1972.*

An official announcement is given on the date of application of Japanese odor-prevention regulations, the no. 91 regulation issued in 1971. The effective date is May 31, 1972.

24489 APTIC NO. 44346

OFFICIAL GAZETTE. *(Kanpo). Text in Japanese. Kanpo (Off. Gaz.), no. 1356:11-14, March 10, 1972.*

An official announcement on the national examination for administrators for public nuisance prevention is issued. There are five degrees of air pollution administrator and four degrees of waste water administrator. The subjects for air pollution includes public nuisance, air pollution regulation, prevention techniques for combustion smoke diffusion, dust collection techniques, measurement techniques, and enforcement of laws to regulate polluters.

24490 APTIC NO. 44347

OFFICIAL GAZETTE. *(Kanpo). Text in Japanese. Kanpo (Off. Gaz.), no. 13511 13-13, Jan. 7, 1972.*

An official announcement is given on giving tests for the purpose of testing qualifications air pollution and waste water treatment administrators. Employees or would be-employees of factories which require the administrators are eligible for registration.

24491 APTIC NO. 44355

OFFICIAL GAZETTE. *(Kanpo). Text in Japanese. Kanpo (Off. Gaz.), no. 13628:2, May 30, 1972.*

An official announcement is given on the regulations of odor prevention. In this new regulation, five compounds including ammonia, methyl mercaptan, hydrogen sulfide, methyl sulfide, and trimethylamine are listed as odorous substances. Sources of odors include animal farms, manufacturer of sweet potato or other potato starches, manufacturer of complex fertilizers including organic fertilizers, manufacturer of glues, feeds, oil fats, and gelatins.

24492 APTIC NO. 44499

Tokyo Metropolitan Environmental Protection Research Inst. (Japan)

AIR POLLUTION. *In: Environmental Protection Summary in Tokyo. p. 1-15, Feb. 1972.*

The general state of air pollution in Tokyo, major sources and emissions, effects of pollution on human health and vegetation, and abatement measures adopted by the metropolitan government are reviewed. The major pollutants are sulfur dioxide emitted from factories and commercial buildings using heavy oil; carbon monoxide, hydrocarbons, nitrogen oxides, and lead in automobile exhausts; and oxidants. In 1970, SO_2 concentration exceeded the ambient standard (0.05 ppm) in the central business districts and industrial areas. Attacks of chronic bronchitis were more prevalent in these areas than in districts with lower concentrations, and plant species vulnerable to air pollution were rapidly disappearing. A 10-year plan was issued by the government with regard to expansion of the surveillance network; procedures and conditions for alerts; control through substituting low sulfur oil for heavy oil and conversion to gas or electric power; and automotive emission control through operating criteria, traffic control, urban redevelopment, and grade separation. The problems involved in legislating and enforcing abatement regulations are reviewed.

24493 APTIC NO. 44482

Blair, Roger and William B. Gatewood

AUTOMATION OF EMISSIONS SURVEILLANCE THROUGH COMPUTER APPLICATIONS. Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 18p., 1972. (Presented at the Air Pollution Control Association, Annual Meeting, 65th, Miami, Fla., June 18-22, 1972, Paper 72-49.)

A review is presented of the development, operation, and maintenance of Kentucky's Emissions Surveillance System. This automated system utilizes a modern computer system to schedule inspections of stationary sources, list uninvestigated complaints, and generate emissions surveillance activity reports. The Emissions Surveillance System achieves rapid scheduling and reporting of activities with minimum manual input and nominal computer costs. Advantages that accrue to this system include: insuring that each stationary source is inspected at the prescribed interval, virtually eliminating manual planning of the monthly workload; providing a visual display of planned monthly activities; providing definite goals against which to measure progress; generating activity reports for internal use as well as meeting the reporting requirements of the Environmental Protection Agency; measuring backlog of complaints; and, providing data to predict manpower needs within the surveillance area. (Author abstract modified)

24494 APTIC NO. 43819

Boserup, Mogens

PUBLIC INTERVENTION AGAINST AND NEW ATTITUDE TOWARDS POLLUTION. *(Samfundsindgreb og ny holdning mod forurening). Text in Danish. Dansk Ind., no. 6:10-11, June 1972. 1 ref.*

The role of public and administrative powers in an effective pollution abatement policy is outlined. The inefficiency of initiatives taken by industry arises from the isolated character of industries and the different degrees of environmental consciousness of industrial managements. This calls for public and administrative intervention in matters of pollution control to secure reasonable and fair distribution of related burdens among industries. An optimum degree of pollution, where no further abatement would be economical for the national economy, should be found. Taxes, proportionate to the generated pollution, should be levied on individual industries, and the policy of subsidies and bans should be extensively applied. The costs of pollution control should be borne by the consumers whose manufacturing gave rise to pollution. Industries can and should be forced to pursue reasonable exploitation of natural resources and energy sources by means of adequate foreseeing, environment-conscious price mechanisms.

24495 APTIC NO. 43817

Bro, Jorgen

DISCUSSION OF THE ENVIRONMENTAL PROTECTION ACT AND AGREEMENTS WITH INDUSTRIES ON STANDARDS. *(Forhandling om miljoret og normaftaler med industrien) Text in Danish. Dansk Ind., no. 6:4-5, June 1972*

General problems of environmental legislation in Denmark and the activity of the newly established Environmental Protection Ministry are outlined. Local authorities and communities will participate in the preparation of environmental standards, and the possibility of setting up an appeal instance to handle standard-related problems will be investigated. The imposition of any environmental standard will be preceded by negotiations between the Environmental Protection Ministry and relevant branches of industry. A bill on the maximum allowable sulfur content in fuel oil was prepared and a new environmental protection bill was submitted to the parliament for debate during the summer.

24496 APTIC NO. 44065

Ferraiolo, G.

CHEMICAL ENGINEERING AND THE ECOLOGICAL AND SOCIAL PROBLEMS. *(L Ingegneria chimica e i problemi ecologici e sociali) Text in Italian. Ing. Chim. Ital., 8(5):153-158, May 1972.*

Atmospheric pollution is most closely linked to industrial activity, predominantly to chemical production, even though vehicular emissions and home heating play a major role. Industrial sources are responsible for localized pollution, while home heating is responsible for diffuse pollution. This pollution, aggravated by vehicular emissions, creates relatively stationary background pollution in urban areas. The effects of pollutants differ by their chemical nature, their concentration, and by a number of physicochemical parameters. Visible pollution is often less noxious than less conspicuous emissions of gaseous pollutants. The sum of the effects of air pollution is closely linked with the diluting action of the atmosphere, which in turn is governed by meteorological, climatic, and local topographic conditions. Thus, a certain level of pollution which in one situation does not disturb the ecological balance can, in another situation be intolerable. A special aspect of air pollution is the fact that, even in biologically intolerably circumstances, respiratory activity goes on. The effects on the fauna, flora, and on the human organism are sometimes latent and indefinable, but grave. Defense against air pollution can be strategic or tactical. Strategic defense comprises all measures aimed at the prevention of air pollution; tactical defense aims at control and abatement. Common to both lines of defense is pollution monitoring. Prevention must be solved by systems analysis and by systems engineering. Air pollution prevention is the task of modern chemical engineering, which must search for alternative non-polluting solutions. Tactical defense encompasses research designed to evaluate the effects of air pollution, a study of the mechanisms of pollution distribution and dispersion, and the development of pollution control methods and technologies.

24497 APTIC NO. 44044

Freeman, A. Myrick III and Robert H. Haveman

RESIDUALS CHARGES FOR POLLUTION CONTROL: A POLICY EVALUATION. *Science, 177(4046):322-329, July 1972. 28 refs.*

Growing interest has been directed toward one alternative strategy for controlling environmental pollution; that strategy is the creation of economic incentives for pollution control by levying taxes or charges on wastes (residuals) discharged to the environment. Many proposals have been made which would directly or indirectly raise the cost of discharging harmful wastes to the environment. Their aim is to induce firms, municipalities, and individuals subject to the charges of wastes to curb their discharges and ultimately to reduce the damages caused by these discharges. Much debate has focused on the efficacy, feasibility, and effectiveness of residuals charges. To dispell confusion, correct misconceptions, and put the more substantive of the criticisms into proper perspective, the residuals charge strategy is compared with the relevant alternative, direct regulation of discharges through permits backed by an administrative and judicial enforcement system, representative of present policies in air and water pollution control. Some of the areas of comparison were: differences in regulation and enforcement, measurement of discharges, cost of pollution control, industrial reaction, effect on inflation and other economic aspects, environmental management, and administration. Experiments are recommended to test some forms of residuals charges, such as a federal charge on emissions of sulfur oxides or a tax on lead additives, or establishment of a river basin authority with responsibilities for air, water, and solid wastes.

24498 APTIC NO. 44265

Gabrisch, R.

DEVELOPMENT AND EFFECTS OF LEGAL REGULATIONS CONCERNING METALLURGICAL PLANTS AND REMELTING PLANTS. *(Entwicklung und Auswirkung behoerdlicher Auflagen fuer Metallhuetten und Umschmelzwerke). Text in German. Preprint, Gesellschaft Deutscher Metallhuetten und Bergleute, Clausthal-Zellerfeld (West Germany), 12p., 1972. (Presented at the Gesellschaft Deutscher Metallhuetten und Bergleute-Hauptversammlung, Stuttgart, West Germany, April 26-30, 1972.)*

One hundred and forty-four metallurgical plants and recasting plants existed in the Federal Republic and West Berlin in 1971. The total turnover was about one billion dollars, 0.8% of the entire industrial turnover. Despite this relatively small fraction of the total industrial turnover, the expenditures for air pollution control measures are remarkable. The new regulations which became effective in 1971 tie the licensing of all melting plants for non-ferrous metals to the presence of the most modern air pollution cleaning facilities. Vacuum melting plants and melting plants for up to 50 kg light metals or 200 kg heavy metals and melting plants for precious metals are excluded. In 1964 the Technical Directives for the Maintenance of Clean Air (TAL) were enacted. They demanded that the sulfur dioxide emissions by lead and zinc plants be reduced as far as possible by passing the roasting and sintering gases to a sulfuric acid production plant. The particulate emissions were limited to 400 mg/cu m during continuous operation for waste gases from lead blast furnaces, from lead reverberatory furnaces, and from zinc muffle furnaces. The particulate emission from lead refineries and zinc distillation plants was limited to 200 mg/cu m. Emissions from copper processing could contain as much as 500 mg/cu m dust. In 1966 this limit was reduced to 300 mg/cu m. For secondary aluminum plants a guideline is being worked out which will recommend the limitation of the particulate emissions from all melting aggregates to 150 mg/cu m and from thermal degreasing plants to 100 mg/cu m. In secondary zinc and copper plants, the maximum allowable emission will be limited to 50 mg/cu m because of the toxicity of zinc and copper. The metal recovery from old cables is connected with emission problems which still require a solution. At present no cable burning plant in Germany is equipped with any dust cleaning devices.

24499 APTIC NO. 44363

Goldman, Marshall I.

POLLUTION: INTERNATIONAL COMPLICATIONS. *Environ. Affairs, 11(1):1-15, Spring 1972. 3 refs.*

The economic consequences of one country s indifference towards the environmental problems of another, the unforeseen consequences of large scale projects, and the pollution of developing countries in a hurry to develop their economy at the expense of the environment are related to a lack of uniform and international pollution laws. For example, it is estimated that adherence to the pollution laws in the U. S. would add 10% to the price of steel produced in this country and put U. S. steel manufacturers at a disadvantage with respect to Japanese manufacturers who do not face as strict pollution laws; the Aswan dam has been shown to affect the environment on a scale that is likely to have effects upon the economy of all the countries in the Eastern Mediterranean; and the attitude of the poorer countries towards importing the advanced and sometimes polluting technology of the richer countries is considered a potential environmental danger.

24500 APTIC NO. 43914

Halpern, Seymour

POLLUTION CONTROL AND WORLD TRADE. *Am. Machinist, 116(11):51, May 29, 1972.*

As it stands now, individual nations that effect pollution controls unilaterally will probably suffer unilateral economic repercussions. United States industry and, in some cases, labor have expressed concern that the international economic consequences of pollution control at home may price some domestic products out of key world markets, result in loss of jobs, and create an unfavorable trend in the balance of payments. In February 1972, a bill was introduced in Congress that would create a Commission on International Trade and the Environment to study and investigate such questions as methods of enforcing standards and cost considerations.

24501 APTIC NO. 43820

Hartig, Elo

ACTIVITY OF THE INDUSTRIAL COMMITTEE IN ENVIRONMENTAL PROTECTION AREA. *(Industriradets arbejde med miljobeskyttelsesproblemerne). Text in Danish. Dansk Ind., no. 6:6-7, June 1972.*

The activity of the Industrial Committee in environmental legislation is outlined. Setting up reasonable, workable rules to reach maximum effect for a given expenditure is among the basic objectives of the Committee which has, in close cooperation with the newly established Environmental Protection Ministry, recently studied a general environmental protection bill and another bill on the reduction of fuel sulfur content. Technical and legal aspects of bills and administrative problems concerning would-be acts are investigated. The reduction of the sulfur content in fuel oil, envisaged for 1973, was opposed by the Industrial Committee on the ground that the costs involved are too high for the possible reduction of a few percent in the sulfur dioxide concentration, since a considerable proportion of the SO2 present in the atmosphere over Denmark originates in foreign countries.

24502 APTIC NO. 44108

Hishida, Kazuo

LAWS AND REGULATIONS CONCERNING AIR POLLUTION. *(Taiki osen kankei hoki). Text in Japanese. Kuki Chowa Eisei Kogaku (J. Japan Soc. Heating, Air Conditioning, Sanitary Engrs.), 46(6):586-601, June 1972.*

The origins and provisions of the Basic Law for Environmental Pollution Control are discussed together with the theories on which the emission criteria specified in the enforcement regulations are based. The Basic Law which was promulgated in August 1967 and revised in December 1970, consists of 29 articles. The environmental pollutions defined by the law includes air pollution, water pollution, noise, vibration, ground subsidence (excepting that caused by mine-related digging), offensive odors, and soil pollution. Enterprises are required to take necessary measures to prevent and abate environmental pollutions caused by their activities, to comply with the measures taken by the state or local public bodies for the purpose of controlling such environmental pollutions, and to endeavor to prevent pollution that may be caused by use of the goods they manufacture or process. The law also stipulates a number of measures the state is responsible for in connection with pollution control. The atmospheric diffusion formulas used for establishing the environmental and emission criteria for various air pollutants are also discussed. With regard to the Air Pollution Control Law, a law pertaining to its enforcement became effective in December 1968. Under this law, operators of smoke-emitting devices or facilities are required to report to governmental agencies and to observe the emission criteria set up by the central or local public bodies. Emission criteria for respective districts of Japan are tabulated, and a nomograph for determination of effective stack heights is included.

24503 APTIC NO. 43845

Hoeffken, F.

THE INSTITUTE FOR WATER, SOIL AND AIR HYGIENE. *(Das Institut fuer Wasser-, Boden- und Lufthygiene). Text in German. Fortschr. Med., 90(14):523-536, 1972.*

The activity of the Institute for Water, Soil and Air Hygiene, established in 1901, is reviewed. Development, improvement, and testing of measuring instruments and the elaboration of microanalytical methods, monitoring, and estimating air quality and alterations in air pollution due to changes in industrial and other activities and dispersion studies, in cooperation with meteorologists, are among the basic activities of the Institute. Studies on possible means of controlling respirable dust, carcinogenic hydrocarbon, and sulfur dioxide emissions are being conducted. Effects of air pollutants on man, animals, and vegetation are studied in long-term experiments. Effects of noise and noise control methods are investigated. Air pollution monitoring stations are operated at Berlin and Frankfurt.

24504 APTIC NO. 43837

Just, Jan

SOME PROBLEMS OF THE ATMOSPHERIC AIR PROTECTION IN POLAND. *(Niektore zagadnienia ochrony powietrza atmosferycznego w Polsce). Text in Polish. Gaz, Woda Tech. Sanit. (Warsaw), 46(2):35-38, 1972.*

Legal, technical and administrative questions involved in atmospheric air protection in Poland are reviewed. Particular attention is paid to methods of laboratory control and to various scientific tests that deal with the nature and effects of air pollution. The conclusion is reached that scientists still know little about the adaptation of living organisms to changing conditions of the environment and that further efforts are imperative in order to unravel the chain of causation involved in that adaptation.

24505 APTIC NO. 44382

Karr, D. J.

PHYSICAL RESOURCES IN ENVIRONMENTAL PLANNING. *In: Annual Progress Report June 1, 1971 to May 31, 1972. Oregon State Univ., Corvallis, Environmental Health Sciences Center, Center for Environmental Management Proj. 18, p. 89-90, 1972.*

Work has been continued on a program to collect, organize, and enter on cards data on Oregon soils. The amount of precipitation falling on a drainage basin and the registered amount of water runoff is being computed. The first objective was to complete one river drainage basin which had completely updated data as to soil types and usages. This has been done for the Willamette River Drainage Basin. The data concerning the flow volumes of the rivers and streams in each basin were purchased with grant funds from the State Water Resources Board. Precipitation for each drainage basin was computed from Soil Conservation Service data for each soil type. Water quality measurements that have been recorded for the effluent waters will be entered into the program and will be increased in a conservative manner as domestic, industrial, and agricultural uses increase. Air quality problems and increasing radiation hazards from power-producing sources will be entered from the best available information. All the data should be coordinated by August 1972.

24506 APTIC NO. 44008

Lundholm, Bengt

INTERNATIONAL ENVIRONMENT MONITORING. *(Internationell miljoovervakning). Text in Swedish. Mod. Kemi, no. 5:35-36, May 1972.*

General problems of international environment monitoring are outlined. Global monitoring should be oriented to such basic problems as potential risks involved in climatic changes due to human activity, in contamination of the biosphere due to wastes, and risks of reduced biological productivity of the soil. Monitoring programs should include physical, chemical, and biological parameters which relate to climatic changes, air, soil, water, organisms, and human health. However, it is difficult to find methods suitable for measurements of relevant chemical, and particularly biological, variables. A network including some 10-20 background and 100-200 regional stations for monitoring global changes associated with climatic changes or pollutant transfer is planned to be set up within the franework of the World Meteorological Organization. While mostly local and national programs are run by the World Health Organization, comprehensive monitoring is involved in the Global Atmospheric Research Program. Establishing coordinating units on the national level represents a major step towards an international monitoring system.

24507 APTIC NO. 44109

Ogawa, Hiroshi

ON LAWS CONCERNING SECURING OF SANITARY ENVIRONMENTS IN A BUILDING. *(Kenchikubutsu ni okeru eiseiteki kankyo no kakuho ni kansuru horitsu ni tsuite.) Text in Japanese. Kuki Chowa Eisei Kogaku (J. Japan Soc. Heating, Air-Conditioning, Sanitary Engrs.), 44(6):602-608, June 1972.*

The Building Control Law (Law No. 20, 1970), designed to secure sanitary conditions in buildings, was promulgated on April 4, 1970. The ordinance for enforcement of the law became effective October 13, 1970, while regulations for its implementation became effective January 21, 1971. Definitions of a building and special types of buildings specified in the law were taken up for clarification of their meaning. The specially designated types of buildings include entertainment facilities, department stores, public halls, libraries, museums, game houses, shops, offices, schools, and inns and hotels. The owner or occupant of a building in the specially designated category is required to observe the specific environmental criteria and other requirements specified in the law and its enforcement regulations; for example, suspended dust should be kept below 0.15 mg/cu m. Detailed standards for air cleanliness and for quality of drinking water and effluents are all stipulated in the law. The owner or manager of a specially designated building must also appoint a qualified person(s) as a building environmental sanitation control engineer after October 12, 1972. The sanitation engineer will be responsible for seeing that all necessary measures are taken to comply with the regulations. To qualify as an engineer, one must finish the training course designated by the Welfare Minister or pass the examination. It is also compulsory to keep a daily record of air and water quality conditions. Such records eill be shown to authorities when required.

24508 APTIC NO. 43750

Ozaki, Masamichi

ENVIRONMENTAL POLLUTION CONTROL SYSTEM. *(Kankyo osen sogo kanri shisutemu). Text in Japanese. Hitachi Hyoron, 54(6):59-64, June 1972.*

The degree of air pollution in Japan has been increasing despite the fact that several major polluted cities have shown a decreasing tendency. Waste water, solid waste, noise, and vibration are posing more and more serious problems. Since the phenomenon of pollution is highly complicated in nature, its prevention needs a comprehensive control to be exercised over every field of industry where the pollution will possibly be originated. The total environmental pollution control system in the article has been formulated to comply with such a need. This total control system which incorporates a computer technique is able to deal extensively with this problem with its high capacity ranging from on-line monitoring and controlling to data-based management. In view of the present status of the pollution, it is expected that the need for this sort of control system will be increased. (Author summary modified)

24509 APTIC NO. 44450

Partee, Frank P. and William B. Gatewood

KAPCIS - THE KENTUCKY AIR POLLUTION CONTROL INFORMATION SYSTEM. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 28p., 1972. (Presented at the Air Pollution Control Association, Annual Meeting, 65th, Miami Beach, Fla., June 18-22, 1972, Paper 72-48.)*

The Kentucky Air Pollution Control Information System (KAPCIS) utilizes the indexed sequential method, a data management technique, to keep track of five basic data files. Registrations, permits, complaints, enforcement actions, and a basic source address file are systematically stored and retrievable in an almost unlimited number of variations to satisfy a wide variety of reporting requirements. Other peripheral benefits are realized in automated scheduling of repetitive work tasks in some functional areas. The concept of KAPCIS and operating experience are detailed. (Author abstract modified)

24510 APTIC NO. 44029

Preece, Jeffrey

AN INDUSTRY S NATURAL CONCERN. *Clean Air, 1(6):7-8, Summer 1972.*

Almost inevitably a big inland power station is sited on a major river to provide the huge quantities of water needed for cooling purposes, and in the characteristic flat landscape of the river valley its chimneys and cooling towers dominate the scene for miles around. However, at almost any of the Central Electricity Generating Board s 180 power stations in England, some aspect of environmental concern is to be seen. Nowhere is it so evident, in so many different ways, as at Drakelow, near Burton-on-Trent. In addition to boiler houses and turbine halls, chimneys and cooling towers, there are also nature trails and a children s field study center at Drakelow. There are a wildfowl reserve, farm area for crops, livestock grazing, and woodlands containing 150,000 trees. Conservation activities at Drakelow are described.

24511 APTIC NO. 44335

Reed, Laurance

BRITAIN S ROLE IN EUROPE S ENVIRONMENT. *New Scientist, 54(802): 756-757, June 29, 1972.*

Achievements of the United Nations Conference on the Human Environment, held in Stockholm, Sweden in June 1972, and recommendations for strengthening the European Economic Community s (EEC) role as regulator of anti-pollution legislation controlling the socio-economic international field, are discussed. The conference showed that major environmental issues cannot be separated from politics. Substantive agreements on monitoring, research, and information exchange were achieved. The conference also helped to alert public opinion to the importance of environmental problems; it provided administrators with a new insight into the scale and complexity of the issues involved; and it gave much on-going activity a point and an urgency that it might otherwise have lacked. It also established laws to eliminate pollution of the seas. The economic and commercial consequences of measures intended to eliminate pollution necessitate action at an international level. Best suited for this purpose is the EEC, because it can promulgate regulations that are binding on industry and issue directives, the objectives of which member governments are obliged to achieve. The measures required to implement a European policy would include: single welfare and tax provisions to limit population growth; joint management of common estates or shared resources; harmonization of measures to save raw materials and curb pollution; and integration of ecological factors in economic programs and policy decisions. International action is needed where more than one country shares the development of a common resource, or where pollution affects the shared environment of several countries. In negotiating common policies for agriculture, transportation, or trade, ecological factors must be integrated into the decisions. Europe can use its power of example and its political and economic strength to influence the lifestyle and behavior of other continents. Tariffs can be adjusted against pollution-generating, resource-intensive goods, to protect those economies which emphasize recycling and internalizing pollution. Also, Europe must exert world leadership in population control. Only when European governments intervene to influence demographic trends at home, will they have the right to make overseas aid programs conditional on control policies in the developing world.

24512 APTIC NO. 44366

Rendleman, Doug

LEGAL ANATOMY OF AN AIR POLLUTION EMERGENCY. *Environ. Affairs, 11(1):90-126, Spring 1972. 147 refs.*

In November 1971 in Birmingham, Ala. the emergency section of the federal Clean Air Act was used for the first time. Particulate emissions had combined with an inversion to raise Birmingham's particulate count over 750. Neither the state nor the local government was able to act. The federal Environmental Protection Agency, early in the morning of November 18, secured a temporary restraining order. Twenty-three major companies, employing a total of about 25,000 production employees, were ordered to phase down or curtail production to lessen particulate emissions drastically. Less than 36 hours later, the temporary restraining order was dissolved on the motion of the Environmental Protection Agency. A breakdown in communication between the affected industries and the federal agency was identified and an amendment to the emergency section of the Clean Air Act that would economically compensate adversely affected industries is recommended. (Author conclusions modified)

24513 APTIC NO. 43781

Ruckelshaus, William D.

TITLE 40 - PROTECTION OF ENVIRONMENT. CHAPTER 1 - ENVIRONMENTAL PROTECTION AGENCY, SUBCHAPTER C-AIR PROGRAMS. PART 52 - APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. *Federal Register, 37(145):15080-15091, July 27, 1972.*

Amendments to part 52 of chapter 1, title 40 of the Code of Federal Regulations are presented. These amendments incorporate corrections and clarifications of the approvals and disapprovals of the State plans for implementation of the national ambient air quality standards. Revisions to the approval/disapproval notices resulting from supplemental information submitted by the States are included. Arizona, Delaware, Hawaii, Idaho, Indiana, Kentucky, Montana, Nebraska, Nevada, Ohio, Pennsylvania, Virginia, Maine, New Mexico, Rhode Island, Utah, Vermont, and Alaska plans are amended. The regulations are effective on the date of their publication.

24514 APTIC NO. 44467

Schwartz, Seymour

A SYSTEMS VIEW OF AUTOMOBILE INSPECTION PROGRAMS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 26p., 1972. 14 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 65th, Miami, Fla., June 18-22, 1972, Paper 72-47.)*

A set of five factors by which control programs can be evaluated is proposed at the outset: effectiveness, costs to the state and to individuals, the distribution of costs to different income groups and indirect social consequences, administrative feasibility, and political feasibility. The major studies performed in California and New Jersey were reanalyzed to determine the effect of including neglected items and different assumptions on the cost and effectiveness results. The elements of a model for calculating the distribution of costs on different income groups and the expected fraction of the population whose costs will exceed a specified amount are presented. Results show an estimated maximum hydrocarbon reduction, taking into account degradation after service and vehicle population characteristics, in the range of 10-15%. Nitrogen oxides emissions show an increase of less than 5%; maximum reductions in the range of 20-25% for carbon monoxide are indicated. Costs to the state for constructing facilities for key-mode or idle testing should be covered by inspection fees of $2 to $2.50, while repair costs are likely to average $25-$35 for vehicles that require service, with 15-20% of repairs likely to cost more than $50. By fuel and tuneup savings, direct costs could be reduced by 25-50% of the repair bill. Political feasibility of inspection is fairly high but there exists a great risk of losing public support which is sensitive to program costs. The benefits of an inspection program do not clearly outweigh the high costs, possible adverse social impacts, and potential public opposition. Non-inspection alternatives should be examined more carefully with the vacuum spark advance disconnect being cited, a method that appears to be much cheaper and more effective for hydrocarbon and nitrogen oxides than inspection-maintenance. (Author abstract modified)

24515 APTIC NO. 44172

Spielman, Herbert

NATO COMMITTEE ON THE CHALLENGES OF MODERN SOCIETY. *Chem. Rundschau (Solothurn), 25(11):295, March 1972.*

The Nato Committee on the Challenges of Modern Society (CCMS) was founded in December 1969. Since then a number of pilot studies have been undertaken, several of which are closely related to the field of environmental hygiene. CCMS is oriented toward action rather than research, serving as a catalyst to encourage positive decisions at the national, regional, and international levels. CCMS has an entirely open policy regarding publicity for its pilot studies. None are classified. The full range of pilot studies thus far undertaken includes one on air pollution with the U. S. as the pilot and the Federal Republic of Germany and Turkey as co-pilots. This pilot study has thus far drawn upon air sampling at three cities, Ankara, Frankfurt, and St. Louis, to derive guidelines on the methodology of air quality assessment and air quality criteria relating to the effects of sulfur oxides and particulate matter. Additionally, a second phase of assessment studies involving carbon monoxide, oxidants, and nitrogen oxides will be conducted, which will include participation by additional Nato countries having expertise coping with these pollutants. Completion of all control technology documents is planned before the termination of this pilot study, scheduled for the spring of 1973. Finally, the terms of reference of the pilot study include the possibility of development of a low pollution power system, namely production of clean automobile engines.

24516 APTIC NO. 44336

Stanley, C. Maxwell

THE ENGINEER AND THE ENVIRONMENT. *Civil Eng. (N. Y.), 42(7):78-79, July 1972.*

The protection and enhancement of the environment will be a huge, costly, and complicated task, involving many engineering functions. Engineers will have to establish environmental criteria, emission standards, and the modeling of systems. Environmental protection calls for waste treatment and disposal facilities of all types, and the design and manufacture of engines, boilers, and other apparatus meeting stringent emission standards. It also calls for development and production of herbicides, insecticides, fuels, chemicals, and consumer products that are more degradable and less harmful. Plants and processes must be modified. New industry must be implemented to recycle wastes. Also, other areas demand intensified attention, such as: soil preservation, conservation of resources; models and programs for cities; transportation systems; and land use. All designs for new projects will have to show concern for environmental standards. The designer must anticipate trends and design so that future standards are met without unnecessary additional costs. Concern for the environment will accelerate the current trend for a multidisciplinary approach. It is recommended that the civil engineer sharpen his awareness and increase his knowledge and competence regarding ecological considerations. He must also help in enforcing new legislation. The civil engineer must provide leadership in the modification or support of governmental programs to insure adequate environmental protection.

24517 APTIC NO. 43707

Stewart, A. B.

CO-OPERATION IN PREVENTION OF AIR AND WATER POLLUTION. *Roy. Soc. Health J. (London), 92(1):3-5,38, Jan.-Feb. 1972. 3 refs.*

Legislation and governmental authorities involved in the control of air and water pollution in Great Britain are described. Much of the work is carried out by local authorities. These local authorities are in the process of reform into larger and more effective units, and the central government has, within the past two years, placed all responsibility for the control of pollution in a new department, the Department of the Environment. There is as yet no Act of Parliament providing powers that extend over the whole field of pollution. There has been a certain measure of control over some industrial air pollutants through the Alkali Inspectorate for more than 100 years. The Clean Air Act of 1956 was directed particularly against the emission of domestic smoke, and local authorities were empowered to create smokeless zones. As of December 1970, almost one million acres, comprising 4.9 million premises, were included in smoke control areas. There has been a dramatic improvement in the atmosphere of many built-up areas. At the moment, there is no effective legislation to control motor vehicle exhaust gases. Recent legislation puts a limit of 89 dBA for new heavy commercial vehicles, 86 dBA for new motor cycles, and 75 dBA for new motor cars. There are also special noise requirements in respect to aircraft operating from the British Authority airports. Water pollution control is in the hands of the river authorities who prescribe standards for effluents.

24518 APTIC NO. 44506

Wiel, Stephen

APPLICATION OF A NEW EVALUATION PROCEDURE TO AIR POLLUTION CONTROL PROGRAM EFFECTIVENESS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 23p., 1972. 5 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 65th, Miami, Fla., June 18-22, 1972, Paper 72-51.)*

Results are presented of a dissertation research project to develop and apply a meaningful evaluation procedure to the Los Angeles air pollution control program. The general approach to the research was to collect data on the Los Angeles County Air Pollution Control District and on Los Angeles air pollution and its effects. Quantitative assessments of the agency input, function, and output were then analyzed to assess the effectiveness of the whole Los Angeles air pollution control program. Data on detailed agency activity, such as the number and disposition of court cases, were of little value in evaluating agency impact. An emission prevention parameter, measured as % emission reduction, best satisfied the primary two criteria for an effectiveness parameter: relating as closely as possible to the goals of the agency and indicating as closely as possible the direct results of agency activities. The usefulness of this factor for other agencies is considered. (Author abstract modified)

24519 APTIC NO. 44074

Wolters

BERLIN WORRIES ABOUT THE AIR. *(Berlin hat Sorgen mit der Luft). Text in German. Tech. Umweltmag., no.3:18-20, June 1972.*

The city of Berlin instituted an environmental protection department which works in cooperation with the city health administration. The special political situation of Berlin does not cause important problems with regard to environment problems. From 1968 to 1971 air pollution measurements have been conducted in Berlin which show a relatively high sulfur dioxide concentration of 150 to 180 micrograms SO2/cu m. This high concentration is due to the densely populated area with a great quantity of individual heating systems. In connection with the Federal Emission Law, the Senate of Berlin is preparing a regulation for Berlin providing for supervision and technical improvements of heating systems and emission restrictions in case of unfavorable weather conditions. In 1972 the city of Berlin will spend $300,000 for short-term measures in the air purification field.

GENERAL

24520 APTIC NO. 44308

Engel, Ronald E.

ENVIRONMENTAL PROBLEMS AND HEALTH. *West V. Med. J., 68(2):30-32, Feb. 1972. (Presented at the Symposium on Air Pollution, Charleston, W. Va., Jan. 30, 1970.)*

The most urgent reason for wanting air pollution abated is the fact that it threatens human health. The Clean Air Amendments of 1970, as enacted by Congress, increased our capabilities for attacking air pollution on a wider scale and, thus, for getting at the pollution sources. The law has also aided the research necessary as a basis for establishing criteria and standards, and has enabled the Federal Government to give state and local governments more of the primary responsibilities for prevention and control of air pollution. To help them, the Environmental Protection Agency has published air quality criteria documents in an effort to attack the pollution problem on a total environmental basis. The criteria documents define the effects of specific pollutants on human health and welfare, and establish the quantitative levels consistent with wholesome air, which as a minimum will protect the public health. The ways in which man might be changing his environment are mentioned, and urban area congestion is considered. The role of physicians with respect to the health response evoked by the common pollutants is considered.

24521 APTIC NO. 43824

Preuss, Harold P.

TECHNICAL DEVELOPMENTS IN 1971. PART 2. ORGANIC (PAINT) COATINGS, PROCESSES AND EQUIPMENT. *Metal Finishing, 70(2):49-75, Feb. 1972. 300 refs.*

Literature concerning technical developments in the following areas is reviewed: resin developments (acrylic, nylon, silicone, urethanes, and vinyls); other raw material developments (additives, pigments, and solvents); surface preparation; coatings; protection against corrosion (mildew defacement); paint handling and application (coil coating, electrocoating, electron beam curing, powder coatings, and containers); paint removal, testing, and analysis; ecology; and health, safety, and the law (lead, mercury, air quality legislation, product labeling, and consumerism).

24522 APTIC NO. 44066

Turk, A., D. Turk, and D. T. Wittes

AIR POLLUTION. *In: Ecology: Pollution: Environment. Philadelphia, W. B. Saunders Co., 1972, p. 79-108. 8 refs.*

Various aspects of air pollution are reviewed. Expressions of concentration for gases and particles are explained. The components of pure air are described and a definition of polluted air is presented. The sources and effects of the following pollutants are discussed: carbon monoxide, carbon dioxide, hydrocarbons, sulfur dioxide, sulfur trioxide, sulfuric acid, nitric oxide, nitrogen dioxide, ozone, oxidants, hydrofluoric acid, and viable and nonviable particulate matter. The effects of air pollution include reduction of visibility and other atmospheric effects, damage to vegetation, direct effects on man, injury to animals, and deterioration of materials. Pollution control measures include filters, cyclones, electrostatic precipitators, scrubbers, adsorption on activated carbon, and incineration. Methods for reducing sulfur dioxide emissions include change of energy sources, fuel desulfurization, emission control devices, more efficient methods of fuel combustion, encouragement of less fuel use, and decreasing the rate of population growth. Problems involved in the switch-over from gasoline driven to battery-operated automobiles are discussed.

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44015	44017	44018	44019	44020	44021	44025	44026	44027	44029	44030	44031	44032	44033
44034	44035	44038	44039	44040	44041	44042	44043	44044	44045	44046	44048	44050	44053
44057	44060	44065	44066	44067	44068	44070	44071	44072	44073	44074	44075	44076	44077
44078	44079	44080	44083	44084	44085	44086	44088	44090	44091	44092	44093	44096	44097
44098	44099	44100	44101	44107	44108	44109	44111	44113	44114	44115	44116	44117	44119
44121	44122	44123	44126	44127	44128	44129	44130	44133	44134	44135	44136	44139	44140
44141	44142	44143	44144	44145	44146	44147	44148	44150	44151	44152	44153	44154	44155
44156	44157	44158	44160	44161	44162	44163	44164	44165	44166	44167	44168	44170	44171
44172	44173	44174	44175	44176	44177	44178	44180	44181	44182	44185	44186	44187	44188

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